NOLOGY DEPT

FLYING

PUBLIC LIBRARY
MAY 14 1945
DETROIT

SECRETARY WALLACE
on Aviation

See page 29

JUNE
1945
35c
In Canada 40c

THE WAR BONDS YOU HOLD ARE FIGHTING BONDS

THE MIGHTY 7th
WAR LOAN

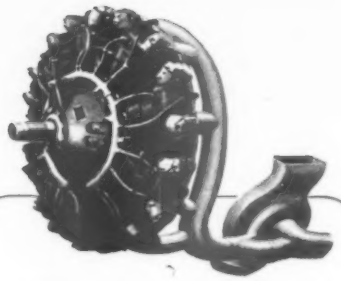
Lower Sound-Level Cyclones for Increased Passenger Comfort

Smooth, quiet flight, which builds appreciation for air travel, is possible in two ways. One is to blanket noise with soundproofing, a method costly in weight. The other is to eliminate noise at its source.

Lower reduction gear ratios on Cyclones have long helped cut propeller noise. Now, coupled with the new Wright turbo-supercharger, Cyclones bring sound levels still lower by decreasing exhaust noise. Added comfort from lowered sound levels is important to all passengers and air crews. It is comfort which will do much to bring about greater public acceptance of travel by air.

Wright Aeronautical Corporation, Paterson, New Jersey, U.S.A.

WRIGHT POWERS THE TONNAGE OF THE AIR



THE WRIGHT TURBO-SUPERCHARGER

Light and compact, the Wright turbo-supercharger provides low level fuel economy at altitude. Air-cooled blades permit buried installations for drag reduction. Lowered exhaust noise adds comfort for passengers and crew.

WRIGHT

Aircraft Engines

A DIVISION OF CURTISS-WRIGHT

Pair of nylons...Superfortress size

A BOEING SUPERFORTRESS lands on enough nylon to make 4,000 pairs of stockings. There are six tires—four like those above; and two others, slightly smaller, that hold up the nose. All have to be stronger than tires ever were before. For sometimes seventy tons of B-29 come down a little too fast, or hit a bump during a bomb-heavy take-off. Too bad if the tires couldn't take terrific loads.

So B. F. Goodrich builds B-29 tires reinforced with nylon.

Any woman can understand why. Nylon made stronger stockings than ever before, and it worked the same way with tires. Nylon plies *doubled* the strength of B. F. Goodrich airplane Silvertowns; resistance to bruising was also greatly increased. And all without adding weight.

B. F. Goodrich development work with special materials and with natural and synthetic rubbers has brought about many improvements in airplane tires . . . and many B. F. Goodrich "firsts" important to car owners.

Typical was the lead B. F. Goodrich took in making and selling synthetic rubber tires. Long before Pearl Harbor, and *three full years* before any other company, B. F. Goodrich sold automobile tires containing synthetic rubber. They learned a lot from making and testing them.

Today, your B. F. Goodrich dealer sells the one synthetic tire that's three years ahead of all others! The extra experience behind it is showing up in extra mileage, extra safety for car owners. *The B. F. Goodrich Company, Akron, Ohio.*

Skyway or Highway

B.F.Goodrich

FIRST IN RUBBER

JUNE, 1945

VOLUME 36 • NUMBER 6

CIVIL AVIATION

Your Post-War Job in Aviation 26
Secretary Wallace on Aviation ..... Fred Hamlin 29
Jet Lightplanes? ..... Maj. Charles M. Fischer 31
How Not to Run an Airport 35
The Warm Front 50
A New Code for Aircraft ..... Franklin D. Walker 54
When You Learn to Fly—Or Teach Flying . . . . John R. Hoyt and William D. Strohmeier 56

MILITARY

We Must Invade Japan ..... Brig. Gen. Henry J. Reilly 21
The Negro in the AAF ..... Phillips J. Peck 24
The 'Black Widow' Boys ..... Gaither Littrell 32
Army Air Forces Report ..... Gen. Henry H. Arnold 43
Iwo Never Was a Pushover ..... Lieut. Kenneth Clayton 48

ENGINEERING

That Weick Patent ..... Edward Doherty, Jr. 46
FLYING Cutaway (Curtiss Commando) 59

DEPARTMENTS

Report from Washington ..... Fred Hamlin 53
London Letter ..... Maj. Oliver Stewart 58
Have You Seen? 73
For Identification 76
I Learned About Flying from That!—No. 68 ..... Albert E. Pacini 78
Letters 80
The Library 84
AOPA News 86
The British Say 100
Fifteen Years Ago 112
Photo Credits 152

PHOTO SALON

Color Section 63

Cover Photograph: Vought Corsair, by T/Sgt. James W. Neilson, USMC, El Toro, Calif.

WILLIAM B. ZIFF
Editor and Publisher

B. G. DAVIS
General Manager

MICHAEL H. FROELICH
Assistant to the Publisher

MAX KARANT
Managing Editor

CURTIS FULLER
Assistant Managing Editor

Associate Editors

CHICAGO
Paul Fountain, Lawrence Keil

WASHINGTON
Fred Hamlin, F. D. Walker

LOS ANGELES
Gaither Littrell

NEW YORK
William C. Hoff

Staff Photographer: Frank Ross

HERMAN R. BOLLIN
Art Director

GEORGE BERNER
Advertising Director

H. G. STRONG
Circulation Director

H. J. MORGANROTH
Production Director

Copyright, 1945
ZIFF-DAVIS PUBLISHING COMPANY

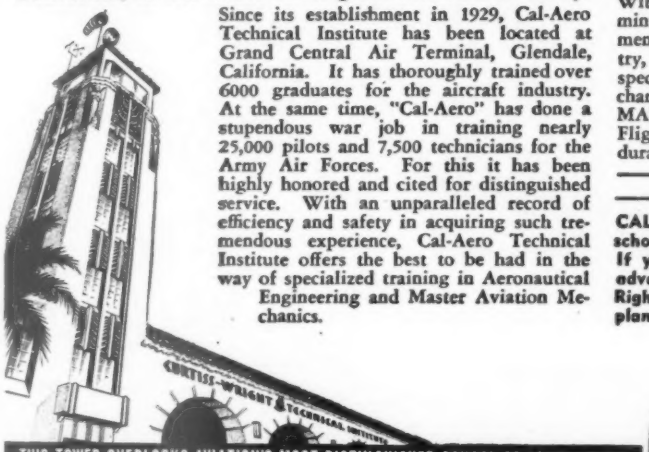
Editorial Offices, 185 N. Wabash Ave., Chicago 1, Ill.
Member of the Audit Bureau of Circulations

FLYING is published monthly by Ziff-Davis Publishing Company at 185 N. Wabash Ave., Chicago 1, Ill. New York Office, Empire State Building, New York 1, N. Y., T. J. L. Crane, Eastern Advertising Manager. Los Angeles, Calif., William L. Pinney, Western Advertising Manager. William M. Springer, Midwestern Advertising Manager. Canadian Advertising Representative, G. J. McGoey, 21 King Street, East, Toronto. London Advertising Representative, J. Forecast, Newspaper Representations, Ltd., 231-232 Strand, London, W.C.2. London office, Grand Buildings, Trafalgar Square, London, W.C.2. Washington office, International Building, 1319 F Street, N.W. SUBSCRIPTION RATES: In U. S., 12 issues, $4.00, single copies 35 cents; in Mexico, South and Central America and U. S. Possessions, 12 issues, $4.00; in Canada, 12 issues $4.50, single copies 40 cents; in British Empire, 12 issues $5.00. All other foreign countries, 12 issues, $7.00. Subscribers should allow two weeks for change of address. Address all subscription letters to the Director of Circulation, FLYING, 540 N. Michigan Ave., Chicago 11. Entered as second class matter, September 8, 1942, at the Post Office, Chicago, Illinois, under the act of March 3, 1879. Entered as second class matter at the Post Office Department, Ottawa, Canada. Contributors should retain copy of contributions. All submitted material must contain return postage. Contributions will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Accepted material is subject to whatever adaptations and revisions are necessary to meet requirements. Payment covers all authors', contributors' and contestants' rights, title and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

CAL-AERO TECHNICAL INSTITUTE

Specialized TRAINING *for your* AVIATION CAREER

TRAIN AT CAL-AERO TECHNICAL INSTITUTE: It has the experience . . . . It has grown up with Aviation . . . . It believes in the future of Aviation . . . . It backs its belief with the purchase of Grand Central Air Terminal, Glendale, California (originally purchased by the Curtiss-Wright Corporation in 1929, at a cost of almost $3,000,000) **. . . . It offers the best specialized training to be had in Aeronautical Engineering and Master Aviation Mechanics with C.A.A. approved courses . . . . It is located in sunny Southern California, in the heart of its giant Aircraft Industry.**



THIS TOWER OVERLOOKS AVIATION'S MOST DISTINGUISHED SCHOOL OF AERONAUTICS

Since its establishment in 1929, Cal-Aero Technical Institute has been located at Grand Central Air Terminal, Glendale, California. It has thoroughly trained over 6000 graduates for the aircraft industry. At the same time, "Cal-Aero" has done a stupendous war job in training nearly 25,000 pilots and 7,500 technicians for the Army Air Forces. For this it has been highly honored and cited for distinguished service. With an unparalleled record of efficiency and safety in acquiring such tremendous experience, Cal-Aero Technical Institute offers the best to be had in the way of specialized training in Aeronautical Engineering and Master Aviation Mechanics.

Our training program has been continuous. Our effort and determination in the past, resulting in our outstanding position today, is the keystone for a bigger and better "Cal-Aero" tomorrow. Today, as in the past, far-sighted and ambitious young men are continuing to enroll at this school,—not only from our own country, but from many foreign countries. "Cal-Aero" is one of the oldest, largest, finest and most substantial aeronautical schools in the nation. Its growth and existence has been built *on merit alone,* built on a foundation of experience, with men who have grown up in Aviation. Today our graduates are engaged in every phase of Aviation activity, not only at home, but in many parts of the world.

With its background of rich experience, coupled with up-to-the-minute modern courses, together with the latest modern equipment, on its own giant airport, in the heart of the aircraft industry, Cal-Aero Technical Institute is the logical place to get your specialized training in Aeronautical Engineering and Master Mechanics. What it has done for its graduates it can do for you. MAIL THE COUPON TODAY *for catalog and full information.* Flight training is restricted to Army Air Force Cadets for the duration.

DISCHARGED VETERANS

CAL-AERO TECHNICAL INSTITUTE is on the list of approved schools on file with the Veterans' Administration. If you are interested in an Aviation Career and want to take advantage of the educational benefits under the G.I. Bill of Rights, write us. We will be happy to help you with your future plans.

CAL-AERO TECHNICAL INSTITUTE

FORMERLY CURTISS-WRIGHT TECHNICAL INSTITUTE

GRAND CENTRAL AIR TERMINAL
1225 AIRWAY, GLENDALE 1, CALIFORNIA
(LOS ANGELES COUNTY)

UNDER PERSONAL SUPERVISION OF MAJOR C. C. MOSELEY, PRESIDENT AND FOUNDER, SINCE 1929

ON OUR OWN AIRPORT - IN THE HEART OF THE AIRCRAFT INDUSTRY

BE WISE—PROTECT YOUR FUTURE

MAIL TODAY • DON'T DELAY

WITHOUT COST OR OBLIGATION SEND ME FULL INFORMATION AND CATALOG ON THE COURSE CHECKED BELOW

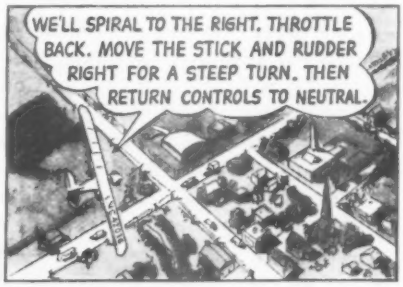
- ☐ AERONAUTICAL ENGINEERING COURSE
- ☐ MASTER AVIATION MECHANIC COURSE
- ☐ SPECIALIZED ENGINE COURSE
- ☐ SPECIALIZED AIRPLANE COURSE
- ☐ POST GRADUATE AERONAUTICAL ENGINEERING COURSE
- ☐ SPECIALIZED AIRCRAFT SHEET METAL COURSE
- ☐ AERONAUTICAL DRAFTING COURSE. HOME STUDY
- ☐ AIRCRAFT BLUE PRINT READING COURSE. HOME STUDY

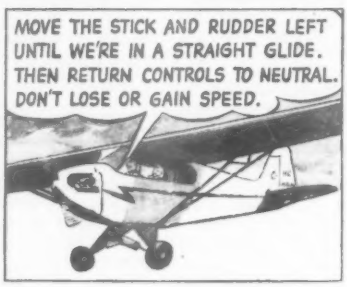
NAME

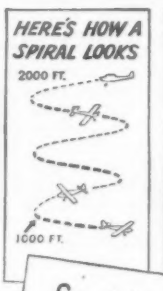
ADDRESS

CITY STATE

DATE OF BIRTH F-6







NOTE: This lesson and others that will follow explain only the fundamentals. See your Piper Cub dealer for actual flying instruction.

MOVIE FILMS AVAILABLE

Movie films that will be a great help in teaching the fundamentals of flying and plane construction are available to you. Write Piper Aircraft Corporation, Lock Haven, Penna. for information on films showing "How to Fly" and "The Construction of a Light Airplane."

IS YOUR TOWN READY TO FLY?

It should plan landing facilities now—for its citizens and its future. The booklet, "What Your Town Needs for the Coming Air Age," illustrates various types. It covers benefits, where to build and how to start. For your free copy, write Piper Aircraft Corporation, Dept. PA65W, Lock Haven, Pennsylvania.

Send for Your "How to Fly" Booklet Today!

Booklet contains over 50 step-by-step photos and descriptions, full-color pictures of Piper Cubs, color drawings of instrument panel and controls. For your copy, write Piper Aircraft Corporation, Dept. PA65, Lock Haven, Penna. Enclose 10c in stamps or coin for postage-handling.

PIPER CUB

Points the Way to Wings for ALL Americans

POST WAR AVIATION OPPORTUNITIES Bulletin

VOLUME 1 NUMBER 8

Weather Personnel of Air Forces Can Expect Peacetime Employment

Globular expansion of air travel has brought an increased need for weather stations and reports throughout the world. This need, together with commercial demands, may be expected to utilize the war-trained skill of many service observers, aerographers, forecasters, et al.

WEATHER BUREAU

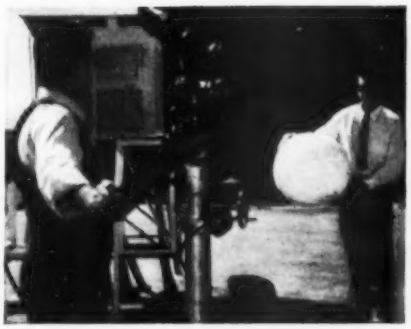
Most obvious opportunity for postwar job hunters is in the Weather Bureau. Most stations established during the war may be expected to continue in operation after victory to provide essential postwar service.

Positions with the Weather Bureau fall into two major categories. One, the professional branch, calls for a college degree in meteorology. The other, or sub-professional, consists of taking weather observations, making and editing weather maps, putting weather information on the teletype circuits, etc. Their duties correspond to those performed in the service by Navy aerographers and Army observers.

A job as sub-professional with the Weather Bureau calls for a high school education, including courses in mathematics and physics. But it has been pointed out that servicemen who are qualified for the work and have had meteorological experience in the military undoubtedly will stand a good chance of employment although they may lack some of the formal educational requirements.

POSTWAR EXPANSION

The scope of operations of the Weather Bureau after the war will depend to a large extent on the expansion of commercial air travel. Although the airlines maintain their own advisory meteorological staffs, they are still dependent on government observations for all basic data.



Weather Bureau officials preparing to make pilot balloon observation. A Civil Service activity, the Weather Bureau will offer postwar employment to many.

WHAT'S IN IT

For men interested in meteorology, the Weather Bureau offers steady employment with Civil Service annuity rights. In Civil Service examinations for government positions, honorably discharged veterans receive a bonus preference of five points. An added incentive for some will be the fact that men may have their families with them on all but a very few of the most remote stations.

OTHER CHANCES

Returning weather personnel may find still another field of employment, according to some officials. Large utility and power companies are already employing meteorologists, and it is not unreasonable to suppose that insurance concerns and like organizations to whom the weather is of financial concern will enter the picture.

For example, storms cut down on daylight and when they spring up suddenly the extra drain on electrical equipment often causes power losses. Accurate forecasting will save money by enabling concerns to anticipate abnormal usage. Water companies are interested in forecasting rain and snow fall which directly affect the amount of water available to them. Storm damage to equipment often occurs which might be averted with proper warning. While the government provides as much information as possible to such commercial operation, the postwar demand is expected to exceed the supply.

The job potential with airlines is rather small. There will be expansion after the war but personnel interested in hooking up with the airlines should expect to find employment somewhat limited.

The eighth in a series of bulletins designed to acquaint ground and flight personnel of the Army, Navy and Marine Air Corps with new developments in the field of commercial aviation. Union Oil Company does not believe the war is won, but we do think many members of the air forces are wondering what they will do when peace comes. We believe they will be interested to know of any opportunities which exist for them. Inquiries are welcome, and we will be glad to furnish information to interested personnel. Address—Aviation Dept., Union Oil Company, Room 700B, 617 W. Seventh Street, Los Angeles 14, California.

AVIATION DEPARTMENT
UNION OIL COMPANY
OF CALIFORNIA
76

THE BLACK WIDOW

In cold, catalog language, the Northrop P-61 is "an airplane designed for the interception and destruction of hostile aircraft in flight during periods of darkness or poor visibility."

But to many a high-flying Heinie and Jap, this twin-tailed beauty with the kiss of death is an unseen nightmare. Her sleek blackness blends with the night . . . her sensitive "feelers" seek out the enemy with deadly accuracy . . . suddenly, she closes in, spitting hell from 20 mm. cannon and .50 cal. machine guns.

She's a tough lady, this Black Widow — largest, most powerful fighter ever built. And she's more than proved her mettle in darkened skies over every battlefront.

We at Chandler-Evans feel a kinship with this plane . . . because our fuel pumps are among those chosen for use with her huge Pratt & Whitney 2000 h.p. engines. And it is the superb performance of planes like this that make every Chandler-Evans man and woman determined to keep on producing the finest fuel pumps possible — *and in quantity.*

CHANDLER-EVANS CORPORATION
SOUTH MERIDEN, CONNECTICUT, U. S. A.

CECO

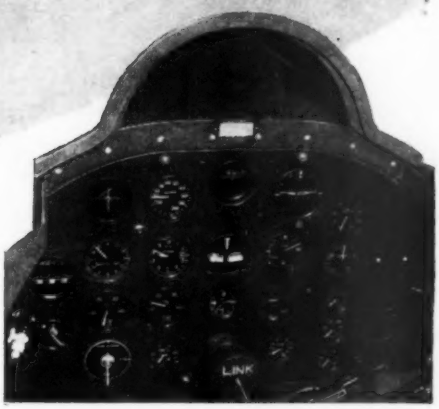
CARBURETORS
FUEL PUMPS
PROTEK-PLUGS

Connecting "Link"

To the pilot, those stubby little wings of the Link Instrument Trainer are really the wings of the plane he wants to fly. The skill he is developing is the "open sesame" to new horizons, to thousands more hours of safe flying — with the ability to take weather in his stride.

One of the best ways to acquire skill in the use of instruments is with these Kollsman-equipped Link Trainers. They are used constantly by thousands of airline and Air Force pilots. Hundreds of private flying schools also are now equipped with them. And a set of good, reliable instruments, such as Kollsman makes for the airlines and the Air Forces, will add real utility and a wider margin of safety to your plane.

If you would like information about these instruments — what they are and what they do — write for our booklet "Facts about Kollsman Aircraft Instruments." Address: Kollsman Instrument Division, Square D Company, 80-08 45th Avenue, Elmhurst, New York.



Instrument Panel of the new '45 Link Trainer

Simulating — in more *flight-like* ways than ever before — the problems of flight and navigation, the new Link Trainer is another step forward in teaching instrument flying technique and developing the pilot's individual skill. As on previous models, many Kollsman Instruments are used.

KOLLSMAN AIRCRAFT INSTRUMENTS

PRODUCT OF

SQUARE D COMPANY

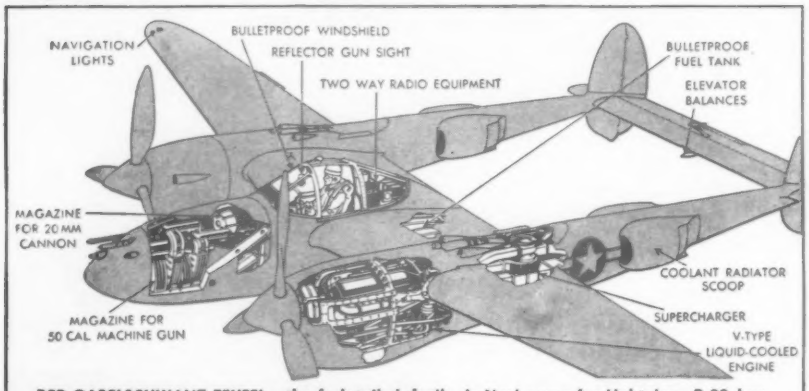
ELMHURST, NEW YORK • GLENDALE, CALIFORNIA

Stars in the sky.. the Lockheed Lightning

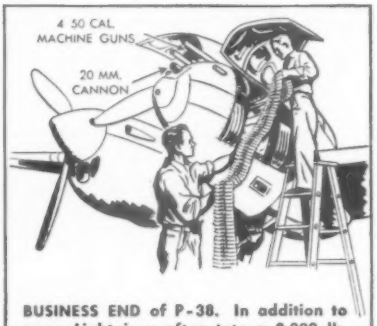
A great airplane that flies first on

CHEVRON AVIATION GASOLINE

FIRST U. S. AIR FORCE PLANE to bag a Nazi in the European Theatre, P-38 has been bad news for Axis fliers ever since. Big (nearly as heavy as transports), Lightnings are fast, versatile, tough. To give such costly weapons the fine care they deserve, Lockheed Aircraft Corp. test-flies and delivers many Lightnings on Chevron Aviation Gasoline.



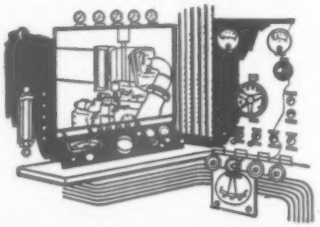
DER GABELSCHWANZ TEUFEL—the fork-tailed devil—is Nazi name for Lightning. P-38 has brilliant record as fighter, bomber, long-range escort and, with cameras replacing guns, as photo-reconnaissance ship. In developing high-octane fuel for ships like P-38, Standard of California scientists have learned much about "tailoring" gasoline to engine requirements—one reason why your postwar plane will perform far better on Chevron Aviation Gasoline.



BUSINESS END of P-38. In addition to guns, Lightnings often tote a 2,000 lb. block-buster under each wing. Pilots say Chevron Aviation Gasoline brings out best speed, smoothest performance of P-38.

COMFORT for pilot in high-altitude togs! Lightning can climb over 40,000 feet, has range greater than many transports, was first fighter to be delivered overseas under its own power. P-38 speed is over 425 mph.

Control panel of engine in which new Standard aviation fuels are carefully tested.



FUEL FOR YOUR PERSONAL PLANE should be chosen with the same care aircraft manufacturers and airlines select theirs. Do as they do, make your own plane a star in the sky with Chevron Aviation Gasoline.

CHEVRON AVIATION GASOLINE

STANDARD OF CALIFORNIA

San Francisco, Calif.

The Life Guards of the ground troops . . .

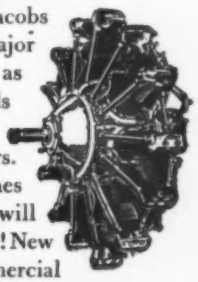
Once the doughfoot envied the airman's easier life and extra pay—and "he rides to work" . . . but today he knows the comfort of a curtain of planes, and that the business-bent bombers passing overhead mean fewer bullets he may have to stop.

At home, however, too few people realize that the busy bombers have been life insurance for the ground troops . . . The Air Forces cost Germany factories, munitions, morale, tied down an estimated million troops in the Reich before D-day . . . kept ships and supplies from reaching Rommel in the last six weeks of the Tunisian campaign . . . softened up Italy . . . broke up Nazi communications and supply lines in France, and actually kept reinforcements from arriving!

In the Pacific, American air power sank one Jap fleet in the Bismarck Sea, starved Jap bases, helped seal off New Guinea, Truk, Yap, Palau, made every island landing easier. How much worse Tarawa and Iwo Jima might have been, had no air attacks preceded the Marines! . . . And now the Super-forts risk three thousand mile missions over water—to save lives on the day our landing craft grate on the beaches of Japan.

To date, the Air Forces have lost about *ten thousand bombers*—but every plane and airman lost has saved two, ten, or a hundred lives on the ground! Be glad we had so many—and grateful to the men who sacrificed themselves to make the bombers worth so much!

BACK of the bomber records was the bomber training program—and the Jacobs engine, used in the twin-engine trainers in which bomber pilots were schooled . . . Subject to the hardest service of any engine, the Jacobs ran up its service period between major overhauls from 350 to as much as 1,200 flight hours, set new records for maintenance and low costs . . . saved money for American taxpayers.



And the more than 30,000 engines Jacobs has made during this war will make Jacobs' postwar engines better! New models are forthcoming for commercial operation and for light planes—with the same old Jacobs stamina and service! Jacobs Aircraft Engine Company, Pottstown, Pennsylvania.

JACOBS · **Pottstown, Pa.**

AERIAL PRODUCTS Inc.

MERRICK, L. I., NEW YORK, U. S. A.

Designers and Manufacturers of

Improved
Pyrotechnic Signaling Devices

In Quantity Production for the Armed Forces

SIGNAL, DISTRESS, SMOKE, HAND
AN-MARK 1 MOD 1
Patent Applied For

Replacing outmoded "stick" rockets
on all ships under the American Flag

PISTOL ROCKET SIGNALS
MARK 3 MOD 0
Patent Applied For

ROBINSON VIBRASHOCK* SUSPENSIONS FLY WITH THE FLAGSHIPS

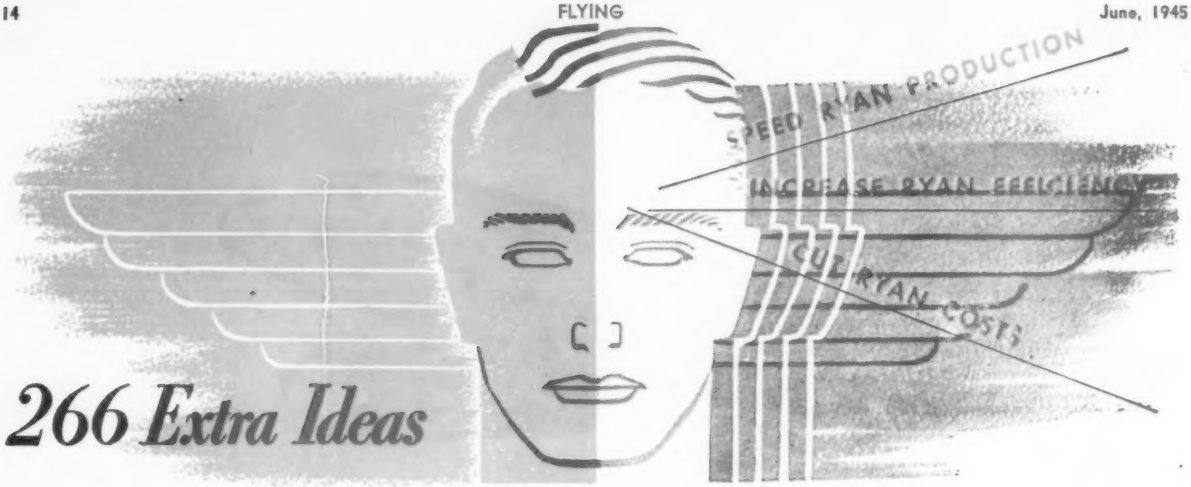
A significant commercial application of the Robinson Vibrashock suspension is now being made on the Flagship fleet of American Airlines, Inc. The equipment shock-mounted is the automatic radio direction finder—a most important navigational device in commercial aircraft.

After testing Vibrashock suspensions for three months, American Airlines ordered this equipment for its entire fleet. The marked increase in service life and reliability attained through the use of Vibrashock will also be reflected in decreased maintenance costs.

Robinson Vibrashock mounts on your private plane engine, radio and instruments will mean similar dependability and economy for you.

*Trade Mark

Robinson
AVIATION INC.
730 Fifth Avenue, New York 19, N. Y.
First National Building, Hollywood 28, Calif.



266 Extra Ideas

RYAN'S Production and Engineering Staffs include many outstanding names of the aviation industry. But no one MAN... *nor one* GROUP... *has a monopoly on ideas. That's why the Ryan Aeronautical Company sponsors Shop Suggestion and Patent Development Plans, which offer valuable incentives to* ALL *employees...for turning in suggestions for improvements. Often, these suggestions turn out to be the sort which occur only to workers in their on-the-job, everyday experience. To date, Ryan employees have submitted 1065 ideas, from which have been obtained 266 valuable contributions to aircraft production. 266 reasons why Ryan production methods mean constantly improved military planes today...safer, lower cost air transportation tomorrow.*

NEW TOOL SAVES MAN-HOURS

When the final section of metal skin is put down on a wing, there remains an overlap on the leading edge which must be trimmed back. The old method for doing this involved shearing off and filing the excess metal by hand. This was slow and produced an uneven edge. Glen L. Humphrey of Ryan's Final Assembly Department suggested mounting a motor-driven vixen file in a vertical position on a guide table, and using the edge of the spar as a guide. This idea not only stepped-up production by saving many man-hours, but produced a cleaner, more uniform trim.

– Shop Suggestion No. 433

NEW BRAKE-SHOE ELIMINATES BREAKDOWNS

Constant expanding and contracting of the circular brake-shoe on a Tannewitz Band Saw causes it to crystallize and break – frequently putting the band saw out of operation. Delmar Conde of Ryan's Mechanical Maintenance Department suggested making a brake-shoe in two separate halves, held together with helical springs, so that the shoe can be expanded without straining the metal. Result: costly, time-taking breakdowns caused by breaking shoes have been eliminated, and the production output of this important tool has been increased.

– Shop Suggestion No. 459

VULCANIZING DOUBLES LIFE OF SCARCE RUBBER

The rubber pad that covers the surface of a hydro-press ram is 6 inches thick and weighs several hundred pounds. Formerly, after both sides of the rubber had become badly chewed from forming metal parts, it was necessary to replace the pad with a new one. R. W. Booth, Sr., of Ryan's Drop Hammer Department, noting that the inner two-thirds of the pad was practically undamaged, suggested grinding off the outside inch of worn rubber from each side, and then vulcanizing an inch-thick layer of new rubber on each side. Result: pad's life is doubled.

– Shop Suggestion No. 1470

RELY ON RYAN
TO BUILD WELL

1922-1945

RYAN *Airplanes*

Ryan Aeronautical Company, San Diego – Member, Aircraft War Production Council, Inc.

DESIGNERS AND BUILDERS OF NAVY FIGHTING PLANES AND EXHAUST MANIFOLD SYSTEMS

for an America on wings

Victory will see civilian America, now grounded by war, again taking to wings. And what of those wings?

Wonderful improvements in personal planes have been wrought by the urgencies of war. No miracles, but a vital speeding of the evolution that has been unfolding since Kitty Hawk. And personal-plane engines have set the pace. The first Franklin engine, born one year before Kitty Hawk, would never know its sleek great-grandchild that will give power—sure, dependable, low-cost power—to your postwar plane.

Our job now is to do everything we can to help end this war. When the job is done, we promise everything our engineering and production skill can devise to help bring an America on wings the kind of plane it wants—at the price it wants to pay.

Franklin
FINE AIRCRAFT ENGINES

AIRCOOLED MOTORS CORP., SYRACUSE 8, N. Y.

Buy More War Bonds and Stamps

Enough...on Time...

and RIGHT!

THE war wouldn't wait—it has never waited—and today it's moving faster than ever. That's why, in the earliest, darkest days, the thousands of Americans at Jack & Heintz set their sights high on production of vital aircraft equipment—and will keep them there to the very end!

As the fighting turned slowly in our favor and now . . . island by island . . . mile by mile . . . draws closer to the enemy homelands, the tempo goes up and up and up. Doubled, trebled, quadrupled production assignments roll in . . . and the equipment rolls out at the same pace. Laboratory-precision products never before turned out in more than a few score are streaming to all fronts by the tens of thousands.

As a result of this intensive manufacturing experience, Jack & Heintz is today a group of several thousand time-conscious, production-minded people who have packed years of experience and know-how into months—broken all records in mass production of precision equipment—and kept faith with or beaten every deadline ever given them.

Just as this organization has kept pace with war, so it can help you in peace. For postwar competition won't wait, either—and the manufacturer who gets to market with *enough . . . on time . . . and right* will head the field.

JACK & HEINTZ
Incorporated

Jack & Heintz Inc., Cleveland, Ohio, manufacturers of aircraft engine starters, generators, gyro pilots, gyro flight instruments, magnetos, motors.

LANDING GEAR . . .

tough as steel, soft as air!

Heat treated, alloy steel gives Aerols* super strength to withstand the terrific impact of landings. Yet their rugged cylinders are filled with soft, resilient air which, together with oil, effectively cushions and absorbs the landing shock.

Pioneered and perfected by Cleveland Pneumatic almost 20 years ago, Aerols are an *established* aircraft advancement — their reliability has been *proved* on every size of plane, in every climate, on every terrain.

Illustrated is the Curtiss C-46 Commando, a leading military transport plane destined for wide postwar commercial use.

THE CLEVELAND PNEUMATIC TOOL CO.

AIRCRAFT DIVISION • CLEVELAND 5, OHIO

Help Finish the Fight! Buy MORE War Bonds and Stamps!

AEROLS*

*PNEUMATIC-HYDRAULIC (AIR-OIL) SHOCK ABSORBING LANDING GEAR

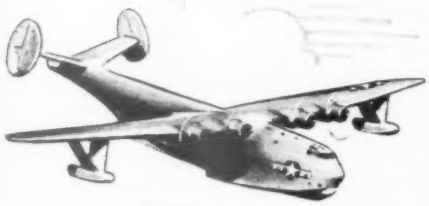
Performance!

Dependability!

Maintenance!

MARTIN Aircraft Excel in All 3!

TAKE the Martin B-26 Marauder, for example. Speed of over 300 m.p.h., the firepower of eleven .50 calibre guns, heavy bombload, plus a record for exceptional accuracy in bombing . . . all these establish her outstanding performance. In dependability, there's her rugged strength, structural soundness, one-engine performance. Combat losses have been only four-tenths of one percent, while in training in the U. S. in 1943 she had the best safety record of any bomber. Maintenance? She requires less than any other bomber. Result: amazing availability which enables her to be in the air well over 80% of the time.



THESE same features are stressed in the Martin Mars. For performance, there's her record of 4,227 miles, non-stop; on another flight she carried 23,846 lbs. of mail. The Mars is the world's most economical airplane. Under optimum conditions, she can operate at less than 6 cents per ton-mile for a 1000 mile trip, which is the lowest direct flying cost for any transport today. Dependability is shown in her ability to make regular trips between Alameda and Honolulu every 2 or 3 days. This same quick turn-around demonstrates the Mars' ease of maintenance, especially since a good part of this time is spent loading and unloading. She's the world's largest flying boat, can climb on two engines and withstood, in test dives, a half-million pound pressure on her wings.

EQUALLY outstanding is the Martin PBM Mariner. Long range, heavy bombload and firepower, a remarkable record both as patrol bomber and transport . . . these are proof of high performance. Dependability is emphasized by rugged construction, ability to take off and land in high seas and capacity to take heavy over-loading in emergencies. Indeed, the PBM's dependability has been demonstrated by several successful landings on dry land with only minor damage to the planes involved. Ease of maintenance has been proven by the Mariner's pioneering of Pacific NATS routes when maintenance facilities at advanced bases were rudimentary.

Martin
AIRCRAFT
Builders of Dependable Aircraft Since 1909

FIRST plane to fly any ocean on a regular commercial schedule, Pan American's Martin-built China Clipper served across both oceans for more than ten years before meeting an untimely end when she struck a darkened boat in a blacked-out harbor. During her decade of service, the China Clipper flew the trans-Pacific route for 9 years, then shifted to the trans-Atlantic run. Her long years of service are added proof of the performance, ease of maintenance and absolute dependability of Martin aircraft. The Glenn L. Martin Company, Baltimore 3, Maryland.

IN the 1945 Red Cross drive, more than 12,000 Beechcrafters were offered a chance to contribute to the world-wide activities of the Red Cross. *Every* man and woman at Beechcraft gave to the Red Cross, setting a national record for large-scale unanimous Red Cross participation without known precedent or equal. Their response was

100%

This record is typical of Beechcrafters' response to the demands of total war. For more than three years, they have voluntarily put more than 20% of their pay into War Bonds. They have maintained one of the lowest absenteeism rates among all war industries. Most important, they have kept production on schedule every month since December, 1941.

Beechcrafters are proud of their 100% record. They intend to continue their 100% backing of the men and women of our Armed Forces, in every way, up to the day of final Victory in every theater of this war.

Beech Aircraft

CORPORATION

BEECHCRAFTS ARE DOING THEIR PART WICHITA, KANSAS, U.S.A.

WE MUST INVADE JAPAN

Bombs raining upon Iwo prepare that island for capture as one step toward the coming invasion of Japan itself.

By Brig. Gen. HENRY J. REILLY, ORC

Assault Japan directly to end the war soonest, says the author.

ADMIRAL NIMITZ recently said in Washington that our fleet in the Pacific, including its air force, now is strong enough to go anywhere it pleases. In the fight for Iwo Jima a large part of our fleet, with its air force, attacked the Japanese mainland directly in order to keep Japanese land-based planes from coming to aid the Iwo garrison. Our fleet also hoped that the Japanese fleet would accept battle. It did not do so.

These facts prove that the direct invasion of the home island of Japan now is a distinct possibility.

Such an invasion is absolutely contrary to what has long been preached by Major DeSeversky and other exponents of the idea that long-range land-based aviation alone can prevent invasion. [In a radio forum discussion with Major DeSeversky prior to the invasion of North Africa, General Reilly maintained the contrary, insisting that aviation today gave the firepower previously lacking.]

It has long been a military axiom that the coast of the home country, if amply fortified with coastal defenses, with a large ground force available in the interior ready to defend itself from the invading forces, with submarine mines, submarines and, above all—since the development of aviation—with a large force of land-based planes, could not be attacked successfully from the sea. The U. S. fleet's guns and aviation would lack the firepower necessary to overcome the

Superfort over Nakajima factory, Ota, Japan. Here, so far, we have followed pre-invasion strategy used in Europe.

coast defense guns and the land-based aviation of Japan, according to this theory. The theory was so accepted by naval strategists that fleets were not organized to defend the coastline, but to be free to go anywhere at sea in order to seek out the enemy's fleet and destroy it.

To invade successfully from the sea, three things are necessary.

First, is to get a fleet of transports large enough to carry the number of ground troops necessary to defeat the enemy's ground troops, the warships needed to protect such a convoy from the enemy's warships, and the air support necessary to protect both from enemy aviation while en route to the invasion point.

We have this. When the transports now being used for the European and Mediterranean fronts are available to bring troops to the Pacific, these added to those we now have in the Pacific can bring the number of ground troops necessary.

Second is that the warships and warplanes be able to stay in the invasion area long enough to establish the invading force firmly ashore. This we have already shown we can do. Our Navy, through the combination of its guns and its carrier-borne planes, now has sufficient firepower to overcome the enemy's fire in whatever region we may choose for our landing.

The third is to insure the continuous supplies of the warships, the airplanes and the ground troops until final victory is had. Our Navy supply force, which has been able to maintain our fleet with its aviation a long way from its home bases for considerable periods of time, shows that we can do this.

From the beginning, our Navy and Army in the Pacific have operated on the Napoleonic principle that decisive victory can only come by the complete destruction of the enemy's armed forces.

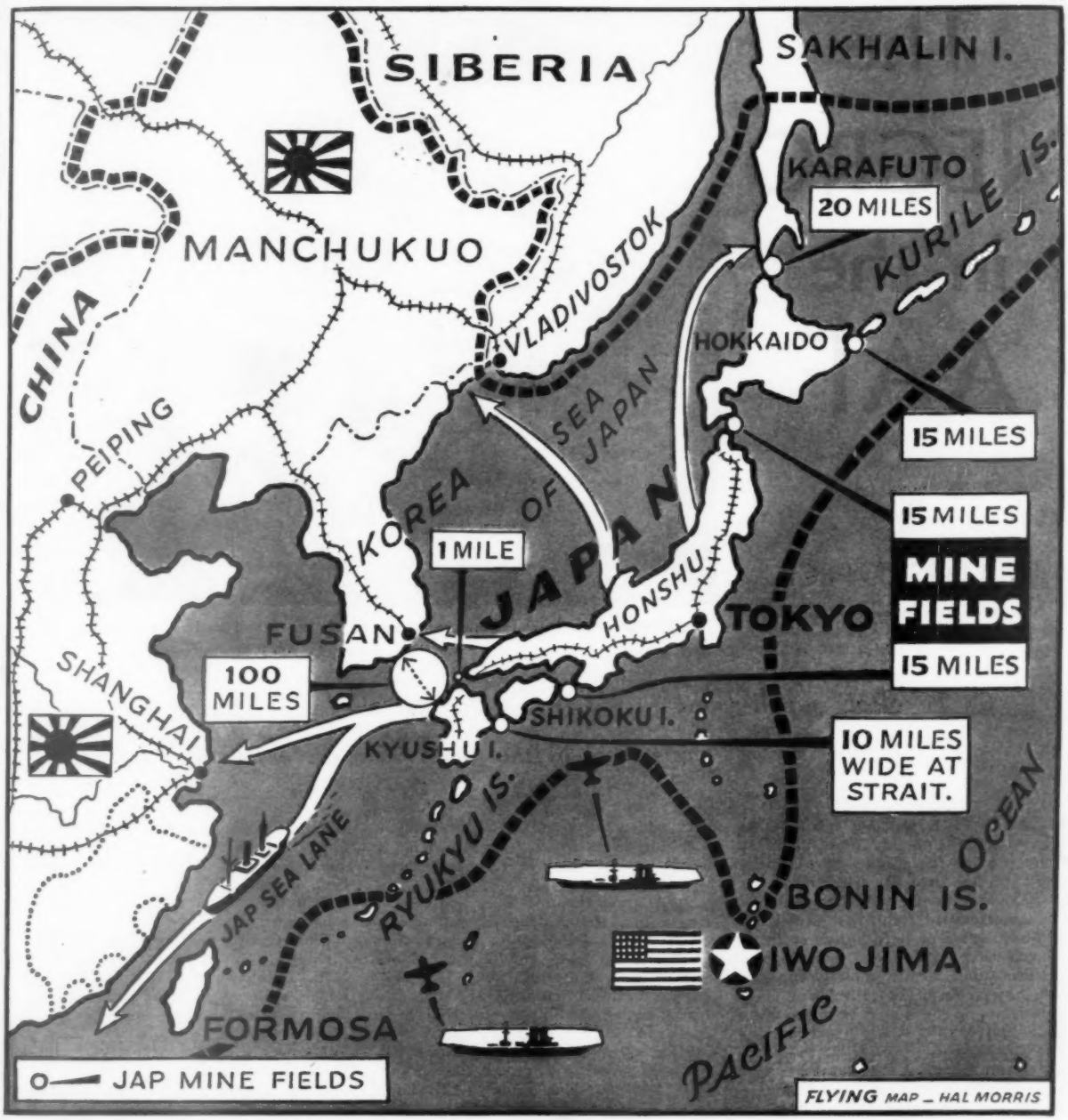
This is in marked contrast with the attempt to use China as a base for long-range bombing, following the same general idea based on Douhet's theories as that used in Europe.

This does not mean that MacArthur and Nimitz are opposed to the use of long-range bombers to soften up the enemy in preparation for a subsequent invasion. They have shown, however, that such long-range bombing is considered to be a preliminary only and that in no way can it take the place of large scale invasion by ground troops.

Two recent events in our war with Japan have shown that these long-range bombers are so dependent upon ground troops in the one case and upon the fleet with its own ground troops—the Marines—on the other, that they cannot operate without the help of both.

In China, the answer of the Japanese to our long-range bombers was the capture by ground troops of many of the airfields from which the bombers operated. They are continuing this operation and the Chinese are unable to stop them.

The island of Saipan, which is being



Japanese communications with the mainland across the protected Sea of Japan are guarded by narrow, heavily-mined straits.

used as a base for the attack of heavy bombers upon Japan proper, was made available to Army aviation only as a result of its capture by combined action of our fleet and its carrier-based planes and ground troops which defeated the Japanese garrison decisively.

Even then it was found that the distance to be flown was too great to afford fighter protection for the heavy bombers and also permit them to carry a big enough bomb load to do damage commensurate with the value of the bombers and their crews.

Therefore Iwo Jima, only 750 miles from Japan, was selected for capture. With only approximately half the distance to fly, weight could be used for bombs which had previously been used for gasoline. This shorter distance also has enabled more than 30 disabled *Superfortresses* to be saved because they could make Iwo Jima but could not possibly have flown back to Saipan. Without the fleet, with its carrier-based planes and ground forces, this island could never have been made available for the use of Army aviation. With the fleet as it is today, with its carrier planes, guns and ground troops, we can seize as many small islands as the Army's heavy bombers may require for preliminary fire on Japan.

The Japanese once boasted that their island bases scattered all over the Pacific gave them a large number of unsinkable airplane carriers. True, they were unsinkable and still are—but they are also unmovable. As a result of their immobility it was impossible for the Japs to concentrate their land-based aviation from even a number of the islands, much less all of them as can be done with carrier-based aviation.

Our power to bring a concentrated fire against any one force of the enemy is increasing steadily. As ships can be moved anywhere at sea while islands cannot,

(*Continued on page* 108)

The NEGRO in the AAF

By

PHILLIPS J. PECK

Staff Writer, International News Service, Washington, D.C.

Pilots of the 332nd Fighter Group, who relieved the old 99th Squadron, brief for a mission.

Italy supplied the first AAF test for the all-Negro fighter groups. Records made there by the famed 99th are excellent.

SEVENTY-FIVE enemy planes destroyed in the air; more than 150 smashed on the ground—so reads the record. In less than a year the all-Negro 332nd Fighter Group, stationed with the 15th Air Force in Italy, has established itself as an efficient, hard-hitting outfit.

Successor to the famed 99th Fighter Squadron, the 332nd Fighter Group has, with the exploits of its trail-blazing predecessor, provided the answer to the question: "How are the Negro flyers panning out in the AAF?"

In training and in combat they have performed on a par with their comrades-at-arms. On the whole, many of the men who learned their aerial lessons on the $2,000,000 airdrome at Tuskegee, Ala., may average a little higher in co-ordination and the pure technique of flying than many of their associates in the AAF because of certain psychological problems which they fought to overcome—a difference in motivation, association and a background farther removed from mechanics.

Col. Noel Parrish, commanding officer of Tuskegee Army Airfield, makes this appraisal of his one-time proteges:

"It is not the worst outfit in the AAF and no one claims that it is the best. It is doing a job. The airmanship and co-ordination of these flyers is good."

The commanding officer of Tuskegee, where, in March, 1942, wings were pinned on the tunics of five young Negro lieutenants, added this pertinent observation:

"Flying is an individual proposition. It is not a racial one. There is no colored way to fly."

In Atlantic City, N. J., recently, Col. Benjamin O. Davis, Jr., commanding officer of the 332nd and holder of the Legion of Merit, the DFC, and the Air Medal with three Oak Leaf Clusters, lifted the curtain on the activities of his four Negro fighter squadrons in the year they have spent in Italy. Flying *Mustangs* on bomber escort and strafing missions is a job well suited to the 332nd, the colonel said. "All the men enjoy it because it gives them the best opportunity for aerial combat."

The 32-year-old West Pointer recounted the details of a mission to Budapest when the 332nd was ordered to strafe river and rail traffic along the Danube. West of Budapest a pilot spotted a low-flying plane and was sent down to investigate. He shot the plane down and then called for the rest of the squadron.

"They were over an airfield where flyers were practicing landings and take-offs," the colonel explained. "They joined the traffic pattern and shot down four more Messerschmitt Me-109's. On their way to rejoin the group they picked up four Heinkel He-111's and after a series of passes got them all."

The squadron proceeded up the Danube and strafed oil barges and railway trains. A third squadron located another airfield and destroyed 18 enemy planes on the ground, while the fourth came upon a motor park and destroyed or damaged a fleet of trucks.

"Not bad for one five-hour mission," commented the colonel.

Underscoring the success of the 332nd Fighter Group was the formation of the 477th Bombardment Group (Medium) which will expand the activities of Negro airmen from fighter plane types to the *Mitchell* bomber. The group's "first pilots" now are winding up their training at Douglas, Ariz.

Many Negro flyers who started fighter training at Tuskegee, but whose weight or height disqualified them for the lighter pursuit planes, were assigned to the 477th after *Mitchell* transition training at Mather Field, Calif. A few pilots returned from Negro fighter squadrons overseas have joined the new bombardment unit after a six-month rest. A certain percentage of the new unit should have combat experience.

The Army has not yet disclosed when the 477th will be completely trained and ready for action.

The 477th is being groomed as meticulously as any other group of pilots in the AAF; its training does not differ from the regular, rigid Army standards. The program for the *Mitchell* flyers involves three weeks of basic classification; 10 weeks of pre-flight work (codes, weather,

(*Continued on page* 124)

Lieut. Col. Benjamin Davis, Jr. led the 99th.

Skilled mechanics of the 332nd Fighter Group repair Allison engine of Mustang.

Awaiting take-off, pilots of the 99th Fighter Squadron assemble in front of the operations tent in the Termoli area, Italy.

CAA survey of employment potentials for the 3,000,000 men now engaged in Army, Navy and Marine aviation presents peacetime requirements that may determine . . .

YOUR POST-WAR JOB IN AVIATION

YOUNG men and women with careers to fashion will find thousands of aviation jobs waiting when the war is over. The total number of jobs in all branches of the industry will probably total several hundred thousand, according to a rough survey which has just been completed by the Civil Aeronautics Administration.

But the number of jobs to be filled is small compared with the 2,500,000 to 3,000,000 men in all branches of Army, Navy and Marine aviation.

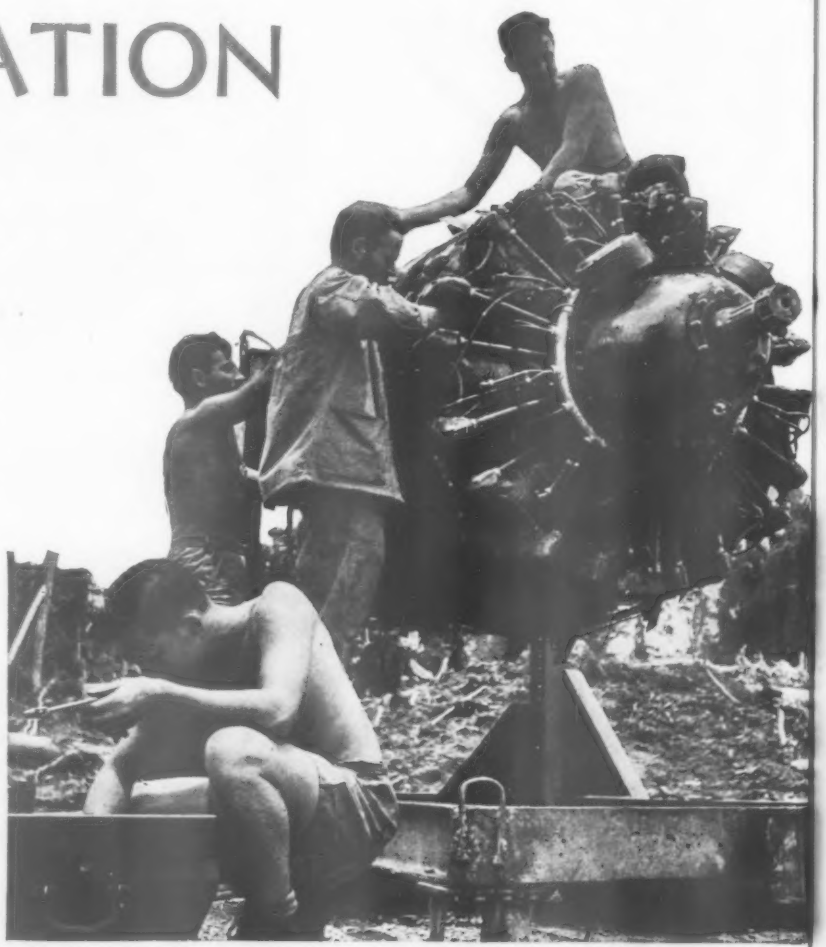
Few men today can foresee the horizon of aviation's future. But even if millions of jobs should one day be available it is certain they will not all be there at once. Piloting and maintenance jobs, lightplane selling jobs, airport and manufacturing jobs will grow in proportion as all aviation grows. New jobs will be created which are not even known today. Some of these the CAA lists are air packaging, new equipment in freight planes, design and manufacture of better dusting equipment, preparation of seeds for aerial planting, and development of allied machinery and services of all kinds.

CAA officials hasten to point out that the aviation industry will exist only as part of the total economic structure and any forecasts must be predicated on general post-war economic conditions.

Probably more than 90 per cent of post-war aviation employment will come within what CAA calls "industrial flying." Some of its possibilities were only partially developed in pre-war days. But, says CAA, "it is a field in which the commercial possibilities will be limited only by the ingenuity, imagination, and sound business practice of the operator."

Activities in this kind of flying vary widely, and are highly specialized. Here are some of the activities and estimates of the employment they may produce:

FLIGHT INSTRUCTION: There is a distinct possibility here of steady employment in a moderately active market. The Civilian Pilot Training Program may be partially revived through a future appropriation by Congress which has legalized the extension of the program for two years, but has not made funds available. As private planes become easier to fly, the flight instructor will probably change into a salesman-instructor who will teach each purchaser as a part of the sales contract.



MAINTENANCE Mechanics serving at Army Air Forces maintenance bases may fill similar post-war jobs with airlines and fixed base operators.

A survey of their fixed base operator members by the Aeronautical Training Society indicates that the operators expect to employ between 10,000 and 11,000 persons in the types of jobs which were available at the Army Air Forces Contract Pilot's Schools, which they conducted and which have now been reduced 80 per cent. About 2,500 of these employees would be flight instructors.

CROP DUSTING: Considerable increase is expected in crop dusting and spraying of insecticides and larvacides. Burned-over rangelands have also been re-seeded from the air where planting on the surface would have been impossible or too costly. Other crops, especially grains, will probably be planted by air, just as rice is at the present time.

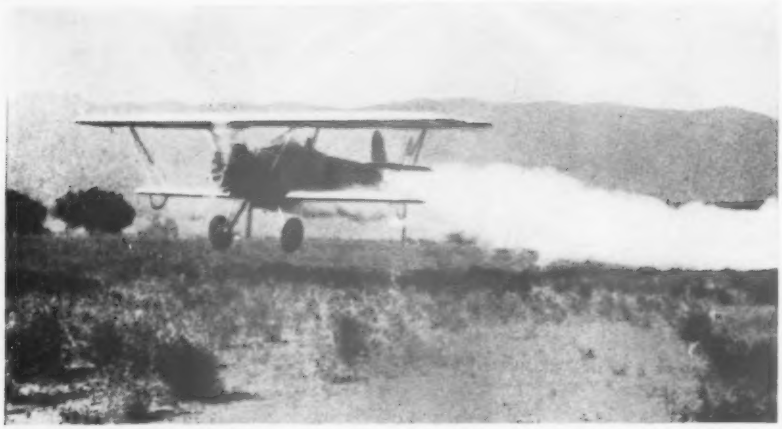
HUNTING OF ANIMAL PESTS started as a sport but has developed into a profitable enterprise. Bounties and sale of skins of coyotes, wolves, etc., pay well in some sections of the country.

FORESTRY: Smoke-spotting, carrying of fire-fighting parachutists, dropping of equipment and food to fire-fighters, radio directions to ground crews, all make the

INSTRUCTION Survey estimates 2,500 instructors will be needed by fixed base operators. Possible revival of CPT programs and addition of flight instruction to college curriculums may create considerable numbers of jobs for instructors.

TRAFFIC CONTROL Expansion of airways will mean more Airway Traffic Control jobs.

CONSERVATION Stocking of lakes with small fish is typical of conservation jobs.



CROP DUSTING Increased use of airplanes for crop dusting, re-seeding remote rangelands and aerial grain planting is anticipated.

PHOTOGRAPHY Aerial photographers will be in demand for survey mapping, soil conservation and flood control, says this CAA survey.

FIRE CONTROL Flying "fire engines" carrying fire-fighting parachutists will materially aid in control of costly, destructive forest fires.

flying fire engine a valuable addition to fire control.

POWER COMMUNICATION AND OIL LINE INSPECTION: Low level flying spots breaks, leaks, and other troubles long before a ground inspector can find them. This type of operation is now being successfully carried on, though to a small extent.

AERIAL PHOTOGRAPHY: A steady increase of post-war business is expected because of better equipment and more experience. Photographing private estates, real estate developments, golf courses; mapping for survey, crop planning, soil conservation, flood control, restoration programs and map making are logical extensions. Spotting of cattle and other animals on range and census-counting of farms and game animals can be done by aerial photography.

FISHING INDUSTRY: Spotting schools of fish for commercial fishing boats and planting of fingerlings in remote lakes difficult to reach by ground transportation offer additional types of work for planes.

CHARTER FLYING: This has always been an important item in the industry and is expected to increase. Along with it will probably be an appreciable increase in rent-a-plane service.

LIGHTWEIGHT AIR FREIGHT: There will be greater possibilities here than in any other commercial transport field. Converted war cargo planes can load tree-ripened citrus fruits in Florida, unload them a few hours later in New England and return the same day with freight, perhaps some product native to the northern states. With fleets of scheduled and non-scheduled freighters the possibilities are enormous.

The various opportunities mentioned above are only the framework for planning. Imagination and ingenuity can lead to still more opportunities. Although these suggested fields in industrial aviation are from a pilot's standpoint, it should be remembered that each enterprise must operate from an airport and must be backed up by men on the ground —mechanics, repairmen, radio operators, field managers, welders, metal workers, traffic controllers, tower operators, weathermen, and all other allied professions.

SCHEDULED AIRLINES: Before the war there were approximately 350 airliners in continuous operation, each requiring three crews and 23 persons on the ground for maintenance and operation—everyone from the dispatcher to the man who pulls the chocks. A fleet of 1,000 DC-3's, or three times the pre-war number and the most optimistic estimate for the first five post-war years, would require about 6,000 to 8,000 men as flight crews in addition to 23,000 potential employees for ground service. Many such positions would be filled by former employees now in service. It is evident—and airline officials emphasize this—that the airlines will not be the big employers of labor after the war [also see "When Johnny Comes Flying Home," FLYING, December, 1944].

The Army Air Transport Command and the Naval Air Transport Service, each bigger than all the pre-war airlines

(*Continued on page* 150)

At first meeting of the CAA Non-Scheduled Flying Advisory Committee, Secretary Wallace confers with William A. M. Burden, Assistant Secretary of Commerce (left), and T. P. Wright, CAA Administrator. Other committee members are in background.

Secretary Wallace On Aviation . . .

This exclusive interview with Secretary of Commerce Wallace is the first detailed discussion of his views on civil aviation. As head of the Department of Commerce, Mr. Wallace now will guide much of the destiny of civil aviation in the United States.—ED.

By FRED HAMLIN

Washington Editor of FLYING

FULL-THROTTLE promotional activities for post-war aviation, with the Federal Government serving as an accelerator rather than a brake, is the objective of Henry A. Wallace in his new role as Secretary of Commerce.

Mr. Wallace, who is learning to fly in order to acquaint himself first-hand with the problems of the private pilot, told this writer that "the only program that can possibly succeed for post-war civilian aviation must be one based on a capitalism of abundance and full employment. This is a sound business view because, in aviation more than in any other industry, the issues are sharply defined: it will either thrive on abundance or starve on scarcity."

Asked what he considers the role of private enterprise in post-war civilian aviation, the new secretary outlined at some length a set of "musts" which he believes would lead to post-war flying prosperity.

"Prosperity is like goodness," he points out, "everybody's for it. It would be difficult to imagine a person connected with aviation who does not favor post-war prosperity. But if we are going to do the sound business thing—if we are going to have a prosperity based on the capitalism of abundance—there are certain *musts* in aviation that the industry and Government are obliged to face together.

"First, there must be developed a safe, inexpensive family airplane. I say this not as an overnight expert, but looking at the pre-war models from the skeptical view of the average car owner whose standards have become high through the rapid evolution of the automobile." It was encouraging to find the CAA's Advisory Committee on Non-Scheduled Flying, which represents all sections of the industry, voluntarily adding to its proposed agenda the problem of developing a better personal aircraft."

Indicating that such development is largely the responsibility of the industry itself, Mr. Wallace expressed the belief that his department could help, especially in experimentation which might be too costly for private enterprise in terms of immediate returns.

Second essential for a thriving aviation business, in Mr. Wallace's view, is an adequate national system of airports. In pro-

viding such a system Mr. Wallace sees room for joint efforts by industry and Government.

"Government should provide 'seed money' for airports," Mr. Wallace stated, "but it is up to businessmen to do the 'cultivating' of service enterprises which will make the airports self-sustaining."

The third prerequisite of aviation prosperity—widespread aeronautical training and education—also calls for co-operation by business and Government, according to Mr. Wallace.

"The Civilian Pilot Training Program begun in 1939 paid the nation rich dividends, and I believe a partnership of this kind between the Federal Government and aviation service operators could be resumed with profit. It will give our armed forces a continuously renewing reservoir of pilots for enforcement of the peace, and at the same time will develop the market for both training and personal planes."

Mr. Wallace made plain that he hoped the time would come when Federal aid to training could be eliminated and it would be possible for Dad and Mother to learn to fly the family plane with the same ease with which they now drive the family jalopy. For the immediate future, however, he saw a need for Government-assisted flight training and the continued spread of aviation education in the high schools.

As a fourth factor in the growth of aviation, Mr. Wallace said, freedom of enterprise must be encouraged—not only in the manufacture of planes but in their distribution.

"It is not enough to protect small businessmen, be they builders of planes or fixed base operators. They must be helped by adequate financing machinery to get the capital which they need to purchase equipment and plants.

"New expanding business areas like aviation must be kept free of the constricting hand of monopoly. There must be a place in aviation—as everywhere in our economy—for enterprising small firms. It is from these new and small firms that the great aviation enterprises of the future will grow.

"If, in 1970, we want to have the Wright Brothers and the Curtisses of 1945 and 1950 coming into flower, it will be necessary to make possible a type of financing for small business which does not exist today. We need new industries and new firms if we are to have industrial progress, and we must not—in aviation above all places—permit them to be stifled by monopoly.

Secretary Wallace's Four-Point Program

1. Development of a 'safe, inexpensive, family airplane as primarily the responsibility of industry but with Government help.
2. Development of an adequate national system of airports which business enterprise would make self-sustaining.
3. Widespread aviation education and a Government-assisted flight training program.
4. Government encouragement to private enterprise in aviation, not only in the manufacture of airplanes but in their distribution.

"The less Government has to do in post-war aviation," Mr. Wallace summed up, "the better.

"This does not mean that the Federal Government, represented by the Department of Commerce's Civil Aeronautics Administration, is in a position to waive all responsibilities for post-war civilian aviation.

"We must continue to be responsible for regulations. Indeed, we must go further: we must develop a completely new regulatory attitude. Where now regulations are enforced much as a traffic cop enforces rules of the road—CAA enforcement officers are called 'Inspectors'—in the post-war world regulatory activities should more and more emphasize the educational aspects of the work—enforcement officers might well be called 'Safety Education Engineers.'

"CAA must also continue to be responsible for the operation and advancement of the airways so that traffic bottlenecks will never retard aviation growth."

Mr. Wallace hopes that the industry will do a promotional job exceeding the fondest imaginings of both private and Government leadership. There is only one alternative, he said—intensive Federal activity wherever industrial activity fails to answer the needs of post-war aviation progress.

Asked what he believes will actually take place when post-war aviation is a reality, Mr. Wallace indicated that in his opinion neither the industry nor the Government will be capable of doing all the promotional work necessary.

"The result, as is so often the case in a democracy, will be a compromise," he said. "I anticipate, for instance, that CAA and the industry both will become more and more active in developments toward a safe, inexpensive family plane.

Mr. Wallace believes aviation has a bright post-war future. "In addition to a manufacturing industry which should have at least 400,000 workers and an annual revenue of two million dollars 10 years after the end of the war," he said, "aviation should create scores of thousands of 'by-products' jobs at airports and along the airways that will add a sizeable total to the nation's 60,000,000 job quota.

"But more important than the figures of the future is the fact that today, in aviation, we can count on Federal-industry co-operative planning toward full employment.

"For in aviation, perhaps more than in any other industry in the world today, you find the little man with the big ideas and the capitalists with vision. The fact that they pioneered in aviation so characterizes them. Both have learned during the war to plan together with the Government so that an extraordinary abundance of fighting aircraft has become ours. There is every reason to believe that similar co-operation in the post-war era will lead to the extraordinary abundance of peacetime flying so necessary for sustained aviation prosperity.

"The aviation industry—going, aggressive, filled with opportunities—should expand far beyond its pre-war levels and become a spearhead of the nation's post-war drive to create for American wage-earners 60,000,000 jobs." END

Secretary Wallace—shown in Ercoupe cockpit during flight training—evidences a personal interest in aviation that promises an air-minded administration for the Department of Commerce.

JET LIGHTPLANES?

Author's conception of Ercoupe modified for small jet engine installation behind the cockpit.

By Maj.
CHARLES M. FISCHER

Jet propulsion can give great altitude, speed and smoothness to personal planes, says Army test pilot.

IT won't be long before the first jet engine for lightplanes is on the test block making its trial run. Already there is evidence that it is practicable and desirable to utilize the many advantages of jet engines in light aircraft. And, though this article does not express official viewpoints, it is certain that the amazing speed and high altitudes the use of jet propulsion has made possible for military planes is opening a new era in aviation—an era that will show marked changes in the construction of all types of planes from luxurious airliners down to personal aircraft.

Large jet engines now being manufactured are supplying the experience and knowledge necessary to the production of smaller units. Even in the short period of time that has been spent on development of the jet, substantial economies in fuel consumption have been made. Even better fuels will be developed by research engineers than the kerosene now being used. At present it seems to make little difference which fuel is used—kerosene, gasoline, fuel oil—all work equally well. The only *must* is that the fuel be extremely clean.

But refinements in combusting these fuels undoubtedly must be accomplished. This will speed the use of jet engines in lightplanes where weight of fuel—even fuel as cheap as kerosene—is all-important.

How can we use the jet engine in present-day lightplanes? The answer is that a jet unit isn't adaptable to any lightplane built today. A new airplane will have to be designed around it. This, however, gives rise to no particularly difficult problems. The jet engine is very compact. It isn't necessary, for instance, to worry the airplane designer with cooling vents, protruding exhaust stacks, or blunt-shaped cowling to cover engines that can never be efficiently streamlined.

The jet-propelled lightplane should be built to cruise around 200 m.p.h. at an altitude of 10,000 feet. If higher altitudes can be maintained the advantage will be greater because the higher the plane flies, and the faster, the more power available.

Stock objection to such lightplane prognosis usually points out that most private flying is done at low altitudes around airports—very few long flights are ever made. But the cause for that situation is that private flyers can't get anywhere—except by flying for long periods in a slow, noisy, uncomfortable airplane. Traveling by lightplane takes too much time and trouble; it isn't worth the effort.

If you live in a valley, as I do here in San Bernardino, and climb over the mountains or buck heavy winds through the passes before you are even well started on your way, a half-hour is already gone. On many coast-to-coast flights on lightplanes the author would have given almost anything to have been able to get to 12,000 feet—out of the rough air—or to have picked up 100 m.p.h. in order to make some real progress. It will take a cruising speed of 200 m.p.h. to give the lightplane utility—to make it *go* someplace . . . quickly and at the most efficient altitude.

The prospective lightplane customer almost always inquires, "But what can I do if I buy this plane? Where can I go?" And then the salesman is in a bad spot. He tries to explain where you can go "at nearly 100 m.p.h., and keeps his fingers crossed. He doesn't mention flying into places like Wyoming, where some airports are 8,000 feet above sea level and the horsepower of a lightplane engine falls tremendously.

Utilization of private flying will really begin when the customer knows that lightplanes can go from Los Angeles to

(*Continued on page* 120)

The 'BLACK WIDOW' BOYS

The radar-equipped, twin-engined Black Widow night fighter is as deadly to the Japanese "bogies" as its name implies.

By GAITHER LITTRELL
Western Editor of FLYING

Trainees at Hammer Field, Calif., learn the art of combat-flying the big radar-equipped night fighters.

"BANDITS" of the German *Luftwaffe* and "thieves" of the Japanese air force took advantage of the dark of night during early phases of the war to operate undetected against Allied cities, military concentrations, supply lines, and airstrips. Then something in the way of black magic was performed by Allied forces which no longer would permit the enemy to attack at will, without opposition, under the cloak of darkness.

The "something" was the perfection of night fighter tactics, the most important part of which is the use of radar—developed to such a degree by Great Britain and the United States that its present usage and future possibilities are amazing.

The best pilots and the best-trained airmen are the men who do our night fighting in the air, ranking AAF officers say. Judging from the multiple training these flyers get, and their results against the enemy, they have been described properly.

Night fighting in the air is not new, but the present radar equipment is. In the first World War, British night fighters operated unaided in the dark to intercept German Gothas and Zeppelins. By the end of that war the British had worked out a haphazard system of defense between the intercepters and ground searchlight units to combat the German aircraft, but that was all.

In this war, the same night defense problem again confronted the British, particularly in 1940 during the Battle of Britain. From bases facing the length of the British Isles, the *Luftwaffe* carried out large-scale daylight bombing raids against English cities. Through the use of radar, these raids were broken up by valiant pilots of the Royal Air Force, flying a comparative handful of *Spitfires* and *Hurricanes*.

The resulting heavy daylight losses forced the *Luftwaffe* to start mass bomb-

ing operations at night. Here again, as it did during the Battle of Britain, ground-operated radar saved the British. Approaching enemy aircraft were detected and tracked by the British stations even as they climbed up from their airfields in France.

But this was not airborne radar. The first airborne radar set was installed on British *Blenheim* twin-engined medium bombers. This plane was big enough to carry the radar set and a radar operator to direct the pilot in intercepting the enemy raider.

However, *Blenheims* soon proved unsuitable because of their unsatisfactory rate of climb, speed, maneuverability and firepower necessary for night fighters. The radar unit also was too unstable for consistent operational work and became a maintenance headache. There also was a lack of ground control and aids to navigation necessary for safe and effective operations.

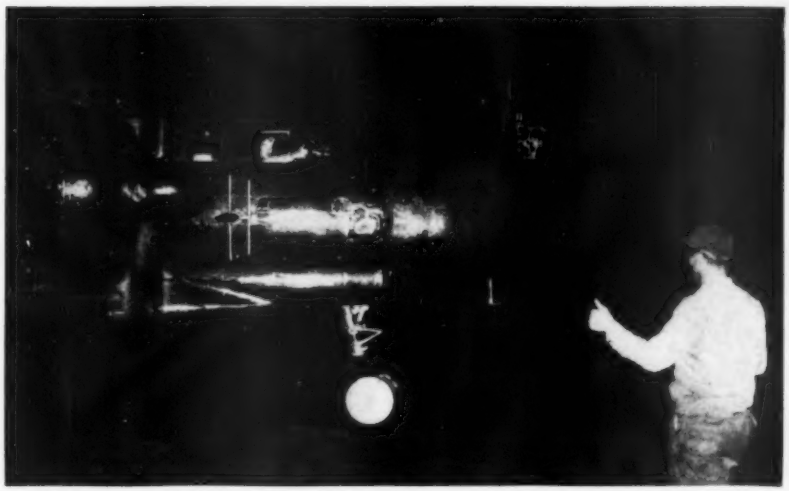
The British persisted, however, and constantly made improvements on radar equipment. They elected to install the newer equipment on *Beaufighters*—two-place, twin-engined fighters with a top speed of 325 m.p.h. at 16,000 feet. This was a wise choice, proved on the night of May 10, 1941, when *Beaufighter* pilots shot down 33 German bombers.

Meanwhile, ground radar stations were being developed to a greater stage of perfection. In addition to helping the night fighters locate their prey, they co-ordinated their findings with the searchlight control, which would send searchlight beams into the sky to direct defending airmen to the enemy bomber concentration. Once the airmen made radar contact with enemy planes ground lights would be doused and the interceptions would be run in radar-directed darkness.

One derivation of this, which was attempted and soon discarded, was the installation of a powerful searchlight in the nose a Douglas *Havoc*. Using radar, the *Havoc* would close in on the bomber at its approximate position, then turn on the powerful beam to illuminate the bomber. *Hurricanes* flying close to the *Havoc* would swarm in to carry out the attack. This was soon found impracticable and was discarded.

As radar improved, the RAF gradually replaced the *Beaufighters* with *Mosquitoes* for the night shift. The twin-engined, light *Mosquito* had speed, high rate of climb, good visibility and maneuverability, plus the firepower of four 20-mm. cannon and four .303-caliber machine guns. It is the principal night fighter used by the RAF today.

First night fighter used by the AAF was the Douglas P-70, a cannon-carrying, radar-equipped version of the *Havoc*. Because of its inability to perform satisfactorily above 20,000 feet, the P-70 was replaced in 1943 by the Northrop *Black Widow* (P-61 in the AAF, FT-1 in the Navy), designed specifically as a night fighter. Capable of high performance above 35,000 feet, the *Black Widow* is faster than any enemy bomber, carries the latest in radar interception equipment, four 20-mm. cannon and four .50-caliber machine guns, is highly maneuv-



Black Widows at Hammer Field, Fresno, Calif., have replaced P-70's for night fighter training. The radar-equipped twin-boomed plane is used for night fighting on all battle fronts.

Students receive night vision synthetic training with the use of special goggles. Importance of seeing at night under combat conditions is stressed in physiology and recognition courses.

Black Widow gunner climbs into pilot's and gunner's entrance in fore part of crew nacelle. His armament consists of four .50-caliber machine guns plus at least four 20-mm. cannon.

Hammer Field officers, left to right, Col. W. W. Kratz, director of operations, 319th Wing; Lieut. Col. A. M. Banks, commander of field, and Col. S. W. Tolle, Jr., commander, 319th Wing.

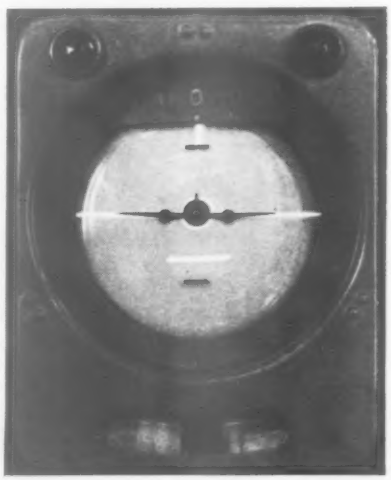
erable, and carries a crew of three.

The first American aircraft ever to be designed right from the beginning as a night fighter, the *Black Widow* flew for the first time on May 26, 1942, is powered with two 2,000-h.p. Pratt & Whitney R-2800 engines. Wing span is 66 feet, length, 48 ft. 9 in., height, 14 ft. 8 in. Fully loaded, it weighs 26,000 pounds; wing loading is reported to be just over 50 lbs. per sq. ft. Another report says the *Black Widow* landing speed is approximately 100 m.p.h., although one is supposed to have been flown at 74 m.p.h. with wheels down, without stalling.

The basic facts about the radar installed in the *Black Widow* have just been passed on to the public for the first time by the Office of Censorship, though its basic principles were discovered 25 years ago. It is radar that makes the night fighter as we conceive it possible.

Briefly, the radar set emits a series of short pulses of radio energy which are reflected back to the sending unit from any object they strike. They travel at the speed of light—186,000 miles per second. Ultra-high frequency radar sets transmit and receive a reflected energy "echo" off the target at the rate of several thousand times per second, making it possible to focus the transmitted energy into a narrow beam.

Measurement of the time elapsing between the transmission of a pulse and its return echo determines the distance of the target. This is accomplished by the use of a cathode ray tube, which creates an electronic beam that can "tone down" the tremendous rate of speed with which the wave is sent and reflected, making it definable. The reflected beam is then transformed onto an oscilloscope, which is in the form of a circular dial. The echo appears as a mark of light on the fluorescent scope and enables the radar operator to determine the range and direction of the target. Another scope is used to fix the altitude.



The pre-war experimental Sperry Flightray used form of radar for instrument flying.

Radar used in *Black Widows* is known as airborne interceptor equipment (AI), while that used on the ground is ground control of interception (GCI). At GCI the radar operators can detect the approach of a "bogey," or hostile aircraft, and constantly plot its flight path and altitude. *Black Widows* then can be vectored to the vicinity from the ground and placed in attacking position—all unknown to the enemy. Then they take over with their AI equipment, which is extremely accurate and which enables them to get the fighter into firing position.

Here a whole new vocabulary peculiar to night fighters comes into use. The "RO," or radar operator, sits in the rear of the P-61 crew nacelle, operating his AI and keeping the pilot and gunner up front continuously aware of the position, altitude and approximate speed of the target on which his radar beam is focussed.

"No joy" means that the night fighter has not yet made contact with the "bogey." The word "contact" means that the RO has picked up the enemy. Here is where the GCI personnel sweats it out. Although it is only a matter of minutes, it seems a short lifetime before the word they want from the pilot comes through. "Murder!"

That's it! That's what everyone has been working to hear since the bogey was first picked up on the scope. It means the enemy has been shot down.

Training of AAF night fighter crews started in this country. A base was set up at an old fighter command school at Orlando, Fla., where some of our pilots and radar observers who had been trained in England were to serve as instructors. Pilots received flight training in P-70's, while the RO's practiced with AT-11's (the Beech *Kansas*). It was not until September, 1943, that the first *Black Widows* arrived at Orlando and the study of night fighter tactics could be learned together by the pilots, gunners and radar observers. In January, 1944, the entire program was moved to Hammer Field, Fresno, Calif., where more than 1,500

(*Continued on page* 146)

After radar guided experimental British Havoc to night target, searchlight in nose illuminated it for accompanying fighters.

How Not TO RUN AN AIRPORT

Entrance to hangar at Airport A. Gas hose on ground is rotting. Bucket of hot ashes is next to gas pump. Note buckled wall beside door.

There is nothing wrong with private flying that some sound business methods couldn't cure.

ABOUT 1,550 of the 1,600 fixed-base operators in the United States are private flying's—and their own—worst enemies. According to a FLYING survey of U. S. aviation insurance companies, the photographs on this and the next seven pages illustrate the average airport, not the exception. One insurance executive said: "If we could put a stop to such operations insurance rates would drop nearly 50 per cent."

Nearly everything that is wrong with private flying stems from the shabby variety of airport shown on these pages. Private airports are inaccessible to a large extent because they are rundown eyesores that property owners don't want around. An amazing percentage of pilots each year let their licenses lapse because the fixed-base operators with whom they do business force them to pay high rates for flying and storage, rarely offer them a place to eat—clean or otherwise—give them no service whatever for their investment.

(*Continued on page* 107)

Hangar at Airport B is perfect setting for a fire; note bales of hay piled against wall, wood structure, littered floor. Quoted monthly rental for Fairchild M-62 at left is $25.

This mad jumble is a storeroom at Airport C. Notable in the debris are wrecked plane parts, whiskey carton, a candy machine and a croquet set. Well-oiled rags also are in heap.

Refuse pile at Airport B. This is along opposite wall inside hangar shown at top of the page. Wing at right is that of Fairchild trainer. Plane's tanks contained nearly 50 gallons of highly inflammable aviation gasoline when this picture was taken and the plane was endangered by debris and materials precariously stored on rafters overhead.

Refuelling a $20,000 fabric-covered Beechcraft inside a hangar at Airport A. Hangar doors are closed to width of gas hose from truck outside. Pool at man's left foot is spilled fuel. Pilot owning Beechcraft here would pay $40 a month for rent and this type of "care."

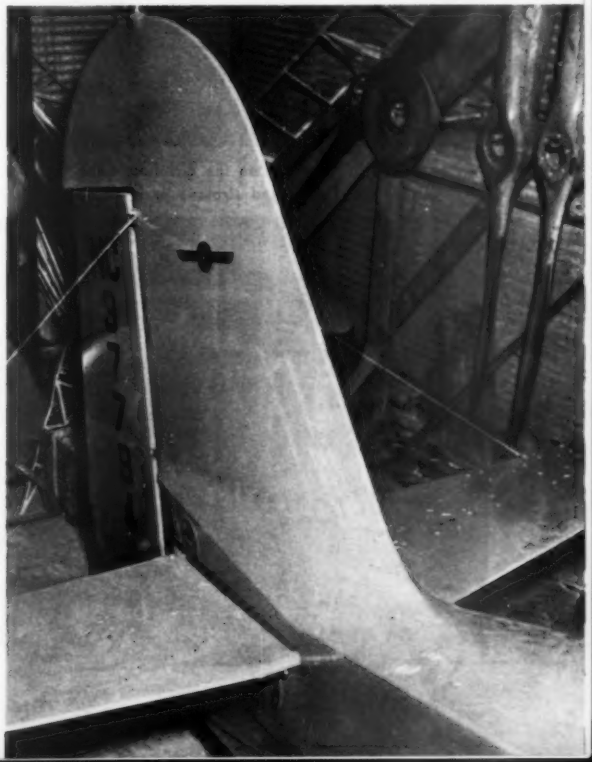
T-shaped handle below is on two-wheeled, 40-gallon chemical fire extinguisher in hangar where Beechcraft in top picture is being refuelled (wing tip at right). Extinguisher is empty and surrounded by heavy oil drums. Floor is saturated with oil. Note swastika.

Plane owners who bring their aircraft to Airport A for repairs or overhaul, have much of that work done in the shop illustrated on this page. One end of the shop (above) presents a helter-skelter array of scattered junk, spare parts, wing ribs and carelessly-strung electric wiring. The other end (below) contains a furnace and ashes on the floor, with part of lightplane fuselage on a broken chair. Some paint spraying is done here.

Landing gear repairs on a Stinson "R" are made with the ship precariously propped up on a jack (background) and on a bulk soap can. This also is Airport A, "one of the best airports" in the entire area.

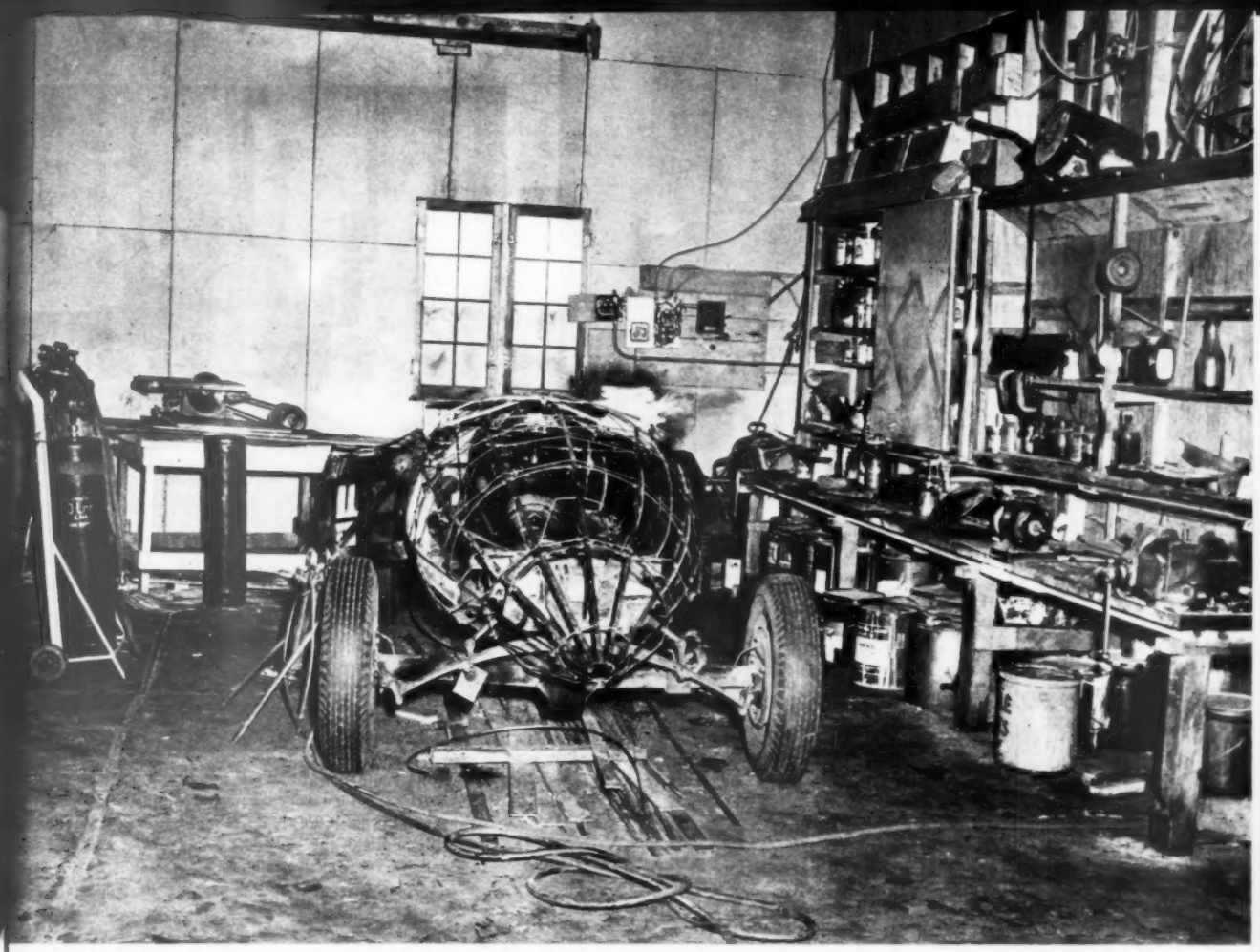
"Service" for a private owner at Airport A. This oil-spattered Rearwin has a trash can and a Kinner engine crate beside it.

Bird droppings from hangar rafters are left on this Rearwin's fabric at Airport A. Note miscellaneous supplies in background.



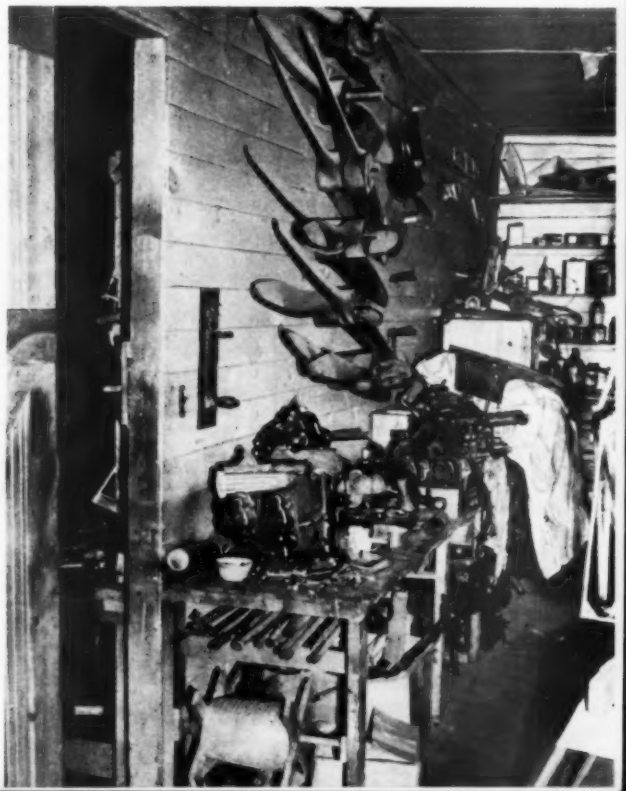
Wooden beams supporting the roof of this hangar at Airport C have apparently rotted through and collapsed. There was nearly an inch of water on the floor, as well as a coal pile (left) when these pictures were taken. Nevertheless, private aircraft are hangared here at a monthly fee of from $20 to $30, depending upon the plane's horsepower. Scenes like this caused CAA inspection officials to report: "The old, slipshod methods cannot survive. Airports will simply have to adopt sound business principles."

These engines, lying on the dirt floor of a hangar at Airport C, are awaiting overhaul. A wide variety of miscellaneous engine and airplane parts also are scattered around on the floor. The wooden hangar is in poor shape.

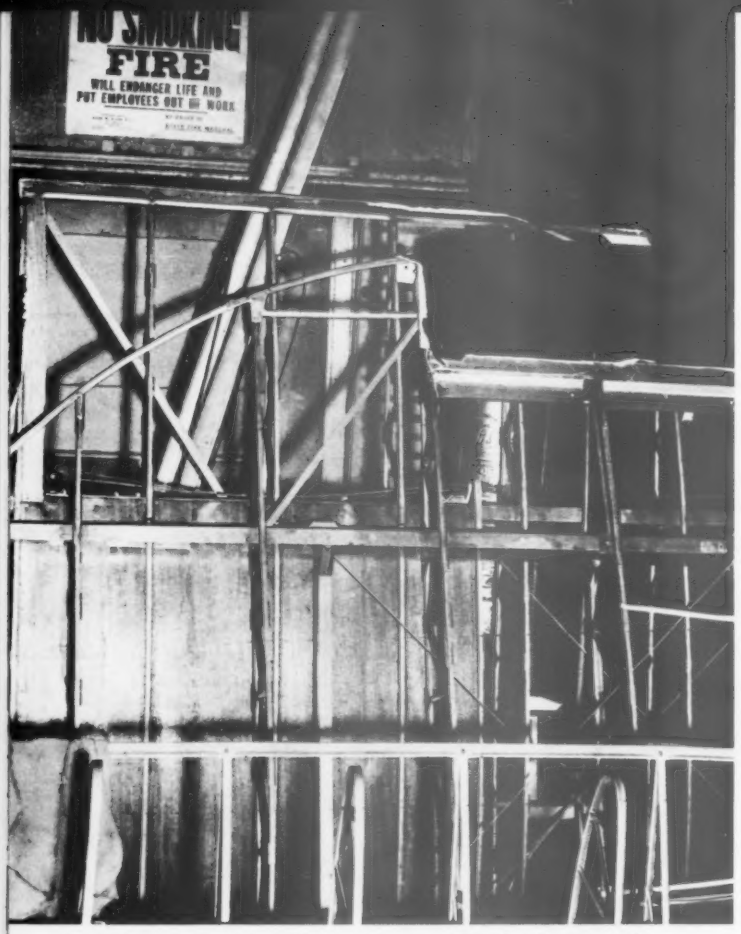


Highly inflammable paint is sprayed in shop where welding is done, at Airport B. Spray gun and dope cans are on and under bench at right. Welding unit is at far left. Note open electric fuse boxes to right of window. Airport mechanic is converting old auto to a racer.

...relessly-punched holes in planes' fabric are common cause of complaint ... private owners. This Waco's tail light is touching wing of Fairchild.



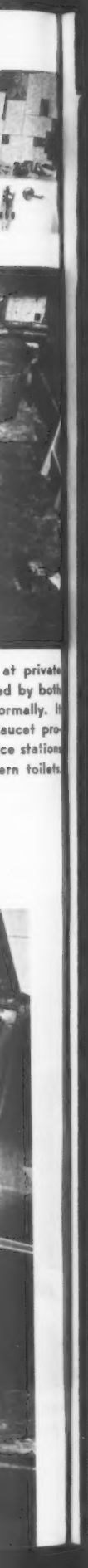
Work bench at Airport B. At least two engines are being worked on. Note fuselage propped on sawhorse (right).



Ironic fire-warning sign overlooks wall extinguisher that is completely blocked off by several wings stacked against it. This also is at Airport A.

Sanitary toilet facilities are practically unknown at private airports. This unsavory scene is at Airport C. Used by both men and women, this toilet cannot be operated normally. It is flushed with the makeshift swinging arm and faucet projecting from beneath washbowl. Automobile service stations have long placed great emphasis on clean, modern toilets.

Its engine running at high speed, this Rearwin was found unattended and facing the hangar at Airport B. This was in violation of Section 60.331 of the Civil Air Regulations. Propeller was turning so fast camera did not catch blades at 1/200 of a second.



at private
d by both
ormally. It
aucet pro-
ce station
ern toilets

ARMY AIR FORCES REPORT

PART 2

By Gen.

HENRY H. ARNOLD

The AAF has made enormous technical progress amidst war, reports its commander.

DURING a stay in England early in 1941 I had occasion to examine various research and development projects on gas turbines and jet propulsion for aircraft. The possibilities of this new means of aircraft power led to the decision that we must initiate a similar gas-turbine and jet-propulsion program in this country without delay. To accelerate such a program from the start it was thought advisable to procure from England the production rights as well as an actual engine which had already been successfully test flown—this was the Whittle engine.

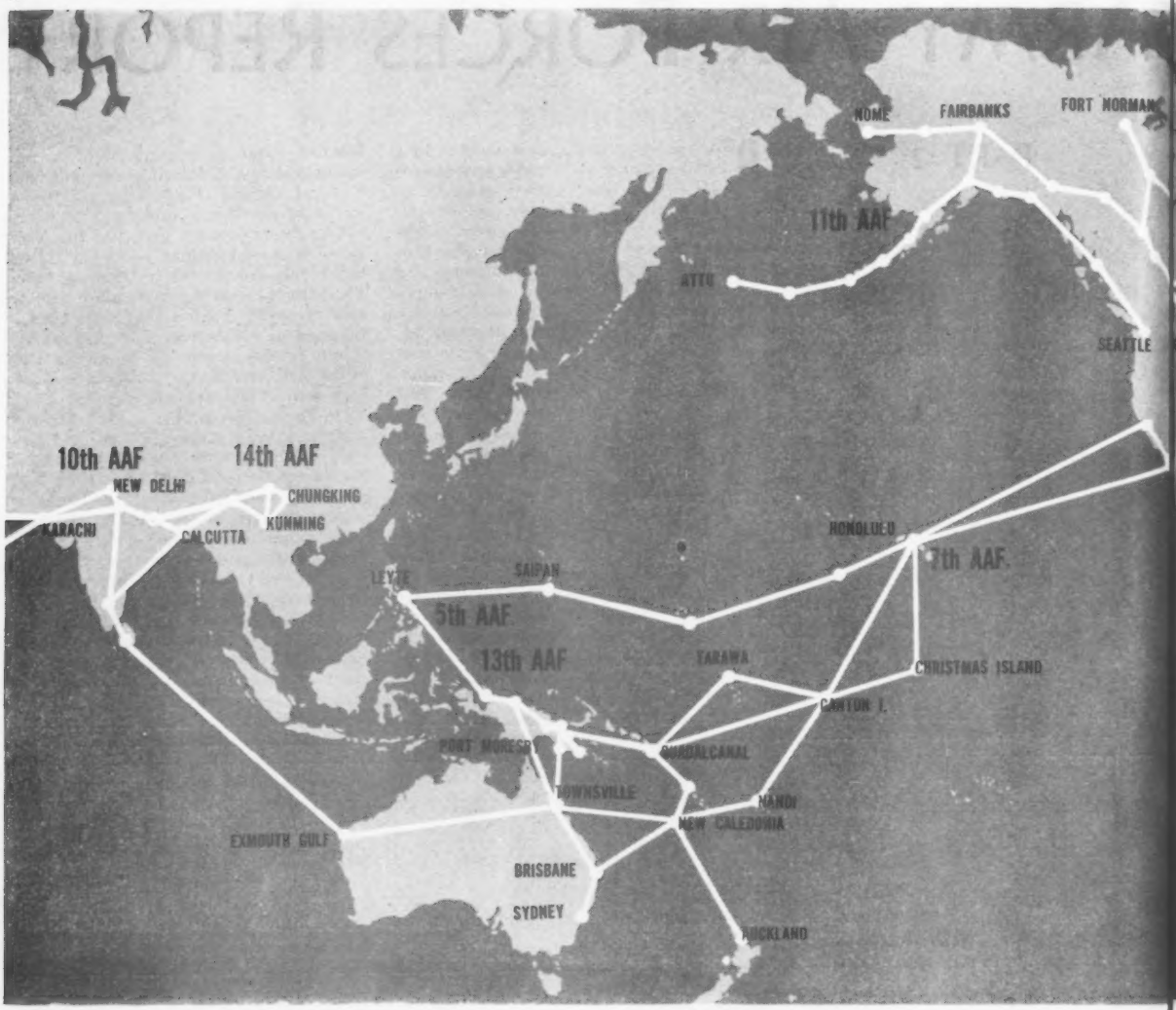
Therefore, on Thursday, September 4, 1941, an initial conference was held in AAF Headquarters to determine the feasibility and desirability of going into immediate production in this country on the English Whittle engine project, as well as to determine which airplane manufacturer was at that time best qualified to carry out the jet propulsion development in conjunction with the General Electric Co., which had had extensive experience with steam turbines and turbo superchargers.

Present at this conference were (the then) Maj. Gen. Carl Spaatz, Maj. Gen O P Echols, and other members of the air staff as well as Messers Muir, Shoults, Stevenson, Jr., and Puffer of General Electric. After an examination of the preliminary data and drawings received from England, General Electric agreed that it would be possible to produce a duplicate engine in six months with two more engines in an additional two months, the latter two engines to be flight articles. The vital necessity for absolute secrecy was stressed. A cable was dispatched to England to obtain complete information. It was further decided to invite Mr. Bell, of the Bell Aircraft Corporation, to Washington the following morning.

On Friday, September 5, 1941, Mr. Bell and his chief engineer, Mr. H. M. Poyer, reported to my office, together with Mr. Shoults of General Electric and the AAF officers present the day before. The proposition was presented to Mr. Bell and after a brief discussion he stated his desire to participate in the project. It was then decided to build 15 engines and three twin-engined airplanes designated as XP-59A. The Bell and General Electric companies were to work in close collaboration. The contracts, under absolute secrecy, were prepared by (the then) AAF Materiel Command. Col. D J Keirn was project officer.

Never has a plane been built in this country under greater secrecy. At both General Electric and Bell, the men who

Vapor trails symbolize the air superiority which has enabled us to destroy or damage 50,658 enemy planes.



The 161,000-mile global network of the Air Transport Command last year carried 560,000 tons of high priority cargo and mail. ATC planes flew

worked on the project were investigated even as to their personal habits, so that not even through careless conviviality could mention of the project leak out. The workers were segregated in blacked-out, heavily-guarded buildings. Even so, some of the workers were unaware of what they were doing. For instance, the men at Bell who were fabricating the wing sections were never allowed to see the fuselage. A year later the first jet plane was disassembled, crated, and sent west with military police riding on the train with it. On the bed of a dry lake in the Western desert it was put together, ground tested and flown.

The absence of vibration and engine noise makes for less pilot fatigue. It appears that the planes are outstandingly safe—the use of kerosene as a fuel greatly reduces the fire hazard, and the low center of gravity facilitates braking and minimizes ground looping. The jet engine is of simple construction—it has only about 10 per cent of the moving parts of the usual reciprocating engine, it has no ignition system, no carburetor, no automatic throttle control and, since there is no propeller, there is no need for prop controls and instruments. No warm-up of the engine is needed—a highly desirable feature militarily.

Since that first *Airacomet*, many other jet planes have been projected, built, flown. So rapid has been our advance that the P-59 is today classed as a trainer.

Global Weather Forecast

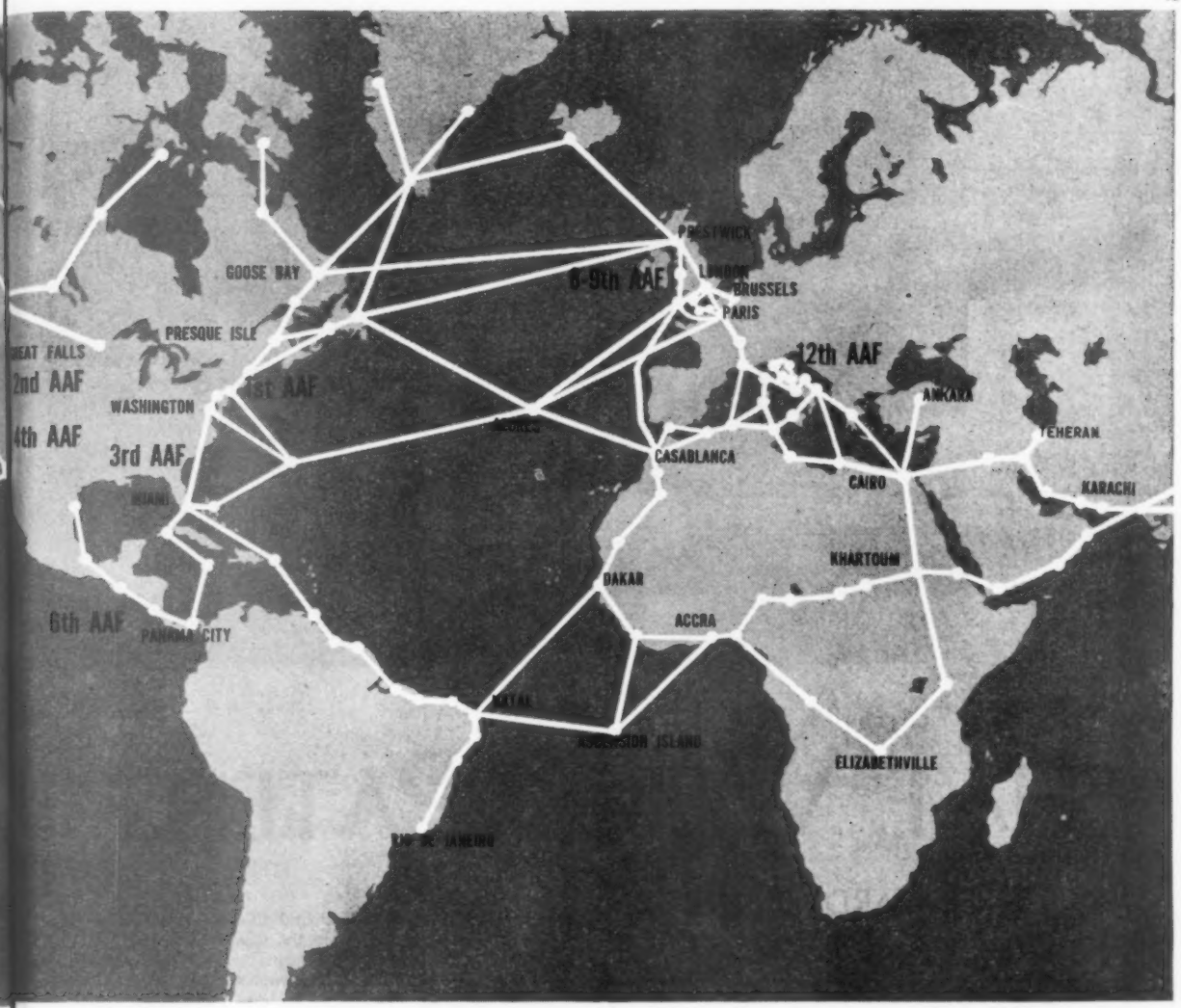
To match strides with aviation, AAF weather forecasting has become global in coverage. The usefulness of such an analysis was apparent when the Weather Division was requested by the commanding general of the 20th Air Force to forecast the weather for the movement of *Superfortresses* from their United States bases to their operational bases in China, a flight of more than half the distance around the globe. Forecasts for this flight called for weather analysis over an area much greater than that covered by any single chart that was then in existence.

The Weather Division evolved a new method in weather investigation—"synoptic climatology." This technique demanded the acquisition and handling of great quantities of past weather data, a problem which was solved by the use of International Business Machines. Once all of the available weather data had been punched on IBM cards, the establishment of any weather relationships demanded by military operations could be readily performed. At the end of 1944, the Weather Division had in its files 35,000,000 cards (105 tons of them) representing weather observations for between 2,000 and 3,000 weather stations over the world.

Mobile Weather Stations

It is not generally known that mobile weather stations mounted on jeeps and trucks are now operating in Italy, France, and in the Pacific. These units go ashore with the first troops since their operations are vital to tactical air operations, bombardment, and the like.

In the Southwest Pacific the weather



...n average of 28,000,000 miles a month, delivered 1,200,000 passengers to world-wide destinations. A plane crosses the Atlantic every 13 minutes.

men go in carrying their equipment on their backs, if necessary, through the jungles. Weather stations in the Pacific are operating in jungles, on mountain tops of the Himalayas, and on the plateau of central China. The weather men may enable an outfit to make 11 missions on the gas for 10, by using tailwinds. This can be of great importance to an outfit flying on the China side of the Hump.

These strides in weather forecasting on a global scale have been made possible by the use of electronics. Two of its principal applications are:

1. The utilization of high frequency radio in storm detection. This has resulted in the detection of storm types containing turbulence which is apt to be dangerous to airplanes in flight or productive of hailstorms. These storms are picked up within the range of the equipment.

2. The determination of upper air winds by the reflecting principle. By utilizing a gas-filled balloon to carry a suitable reflector aloft, the direction and movement of upper air winds can be determined by tracking with ground equipment the reflector as it moves with the wind layers aloft. This principle enables the determination of upper winds under conditions which prevent the utilization of the visual methods heretofore used.

Rockets Used by Aircraft

Airborne rockets were first used in the Army Air Forces by the 14th Air Force in China during March. These 4½-inch rockets were fired from tubes mounted on fighter planes. Targets were Japanese supply dumps, hangars, parked aircraft, bridges, and river boats and other transports. In July the 9th Air Force first used in combat the new five-inch HVAR rockets, with Type Zero rail installations, developed by the National Defense Research Committee for the Navy. Employed against locomotives, tanks, armored cars, gun emplacements, and concrete defenses from *Thunderbolts*, these rockets proved extremely effective. In the Mediterranean theater *Thunderbolts* firing 4½-inch rockets from tubes at point-blank range have been used for ground-air operations. They have also been successful on targets of opportunity. The 10th Air Force has recently reported from Burma that 12 launcher tubes have been mounted on *Mitchells* and that these aircraft have been very effective against ground targets. At the present time the Army Air Forces are co-operating with the Office of the Chief of Ordnance in the development and adaptation of still more powerful rockets for use by aircraft. Far more extensive use of existing types of rockets is also anticipated during 1945.

Maintenance Developments

Based on experience gained in the invasion of Sicily and Italy, special aircraft supply compacs were worked out for the invasion of France. Each compac supplied a complete airdrome for 30 days and was loaded into special trucks. These trucks went across with the invasion and rolled up to the airdrome where the drivers simply lifted the lids on the va-

(*Continued on page* 91)

The Weick W-1A was preliminary design out of which present Ercoupe grew. It had two-control linkage, tricycle landing gear, non-spinning characteristics.

THAT WEICK PATENT

By EDWARD DOHERTY, Jr.

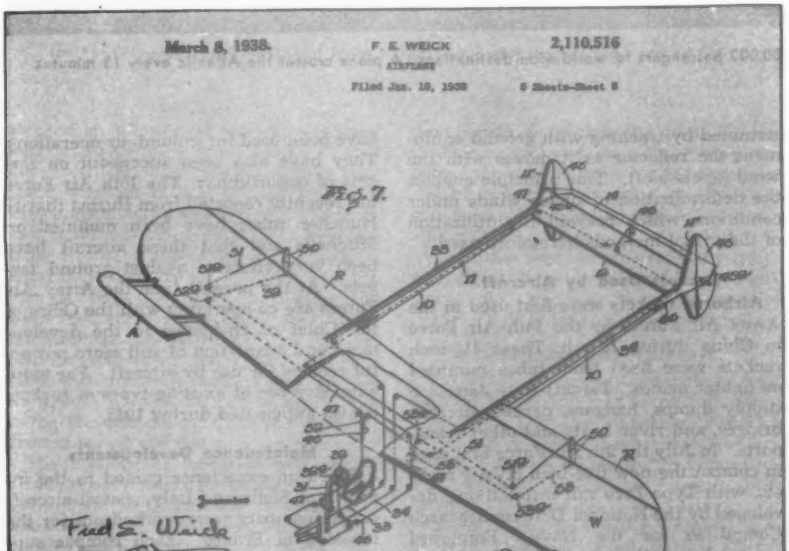


Diagram from Weick's patent shows linkage which is basic in all present-day two-control planes.

IF YOU had all the facilities and know-how in the world you could not build a non-spinnable, two-control airplane like the Ercoupe or the *Skyfarer*—unless you were granted the rights to do so by the man who owns the basic patents. He is Fred E. Weick, chief engineer of the Engineering and Research Corp., Riverdale, Md., and the patents he owns have a steadily increasing value as more and more people turn their post-war airplane aims from conventional three-control planes to the non-conventional two-control planes covered by Weick's inventions.

Weick owns the patents personally, and not in partnership with Engineering and Research Corp., whose 112 Ercoupes built before the war incorporating these patents have excited the imaginations of post-war aviation planners. He developed the patents on the tricycle gear and linked controls, and on a limited travel elevator which prevents spinning, during his spare time in the early 30's. When he joined Erco in 1936 as chief engineer, the company—then exclusively engaged in the manufacture of aircraft tools and fabricating machines—could not afford to buy the patents outright.

Now, although they have been assigned to Erco, Weick retains the right to offer the patents for use to any other companies of his choosing on a royalty basis. Thus he is in the peculiar position of creating competition for the firm of which

Pre-war Ercoupe is present development of the Weick patent. Improvements over W-1A include landing gear and way in which wings approach a stalling condition.

Fred Weick's basic patents on non-spinnable, two-control aircraft are a vital factor in the post-war plane market.

he is one of the top-ranking officials.

Recognizing that a large segment of the personal plane-buying public wants planes with these improvements, at least two companies have already made agreements with Weick to build planes incorporating his inventions and others are considering it seriously. The first to do so was General Aircraft, whose *Skyfarer* incorporates the two-control feature and tricycle landing gear of the Ercoupe. though it differs in other respects—notably by obtaining directional control solely through use of ailerons or wing spoilers and absence of a rudder.

Now Aeronca Aircraft Corporation Middletown, O., has announced that it will build a plane much like the Ercoupe under patent agreements with Engineering and Research Corp. Weick makes no secret of the fact that other lightplane manufacturers are considering following suit. Furthermore, an official of Erco hints that at least three large manufacturers that never before built lightplanes have tried to buy out Engineering and Research.

That the Ercoupe's design was a great advance toward putting a plane in every garage can scarcely be denied. It can be soloed by most beginners in less than five hours. The CAA has certificated it as "characteristically incapable of spinning." It can be landed safely in a moderate crosswind. Its aileron-rudder linkage makes it impossible for a beginner to cross his controls or make a bad turn through lack of co-ordination, and the Ercoupe can land at maximum speed as well as minimum, or with the brakes locked. It will not groundloop unless badly mishandled.

(*Continued on page* 96)

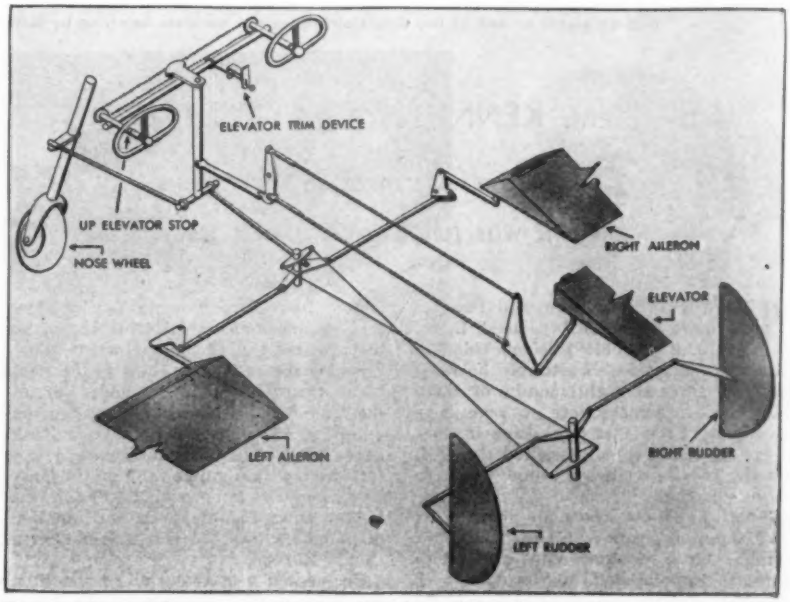
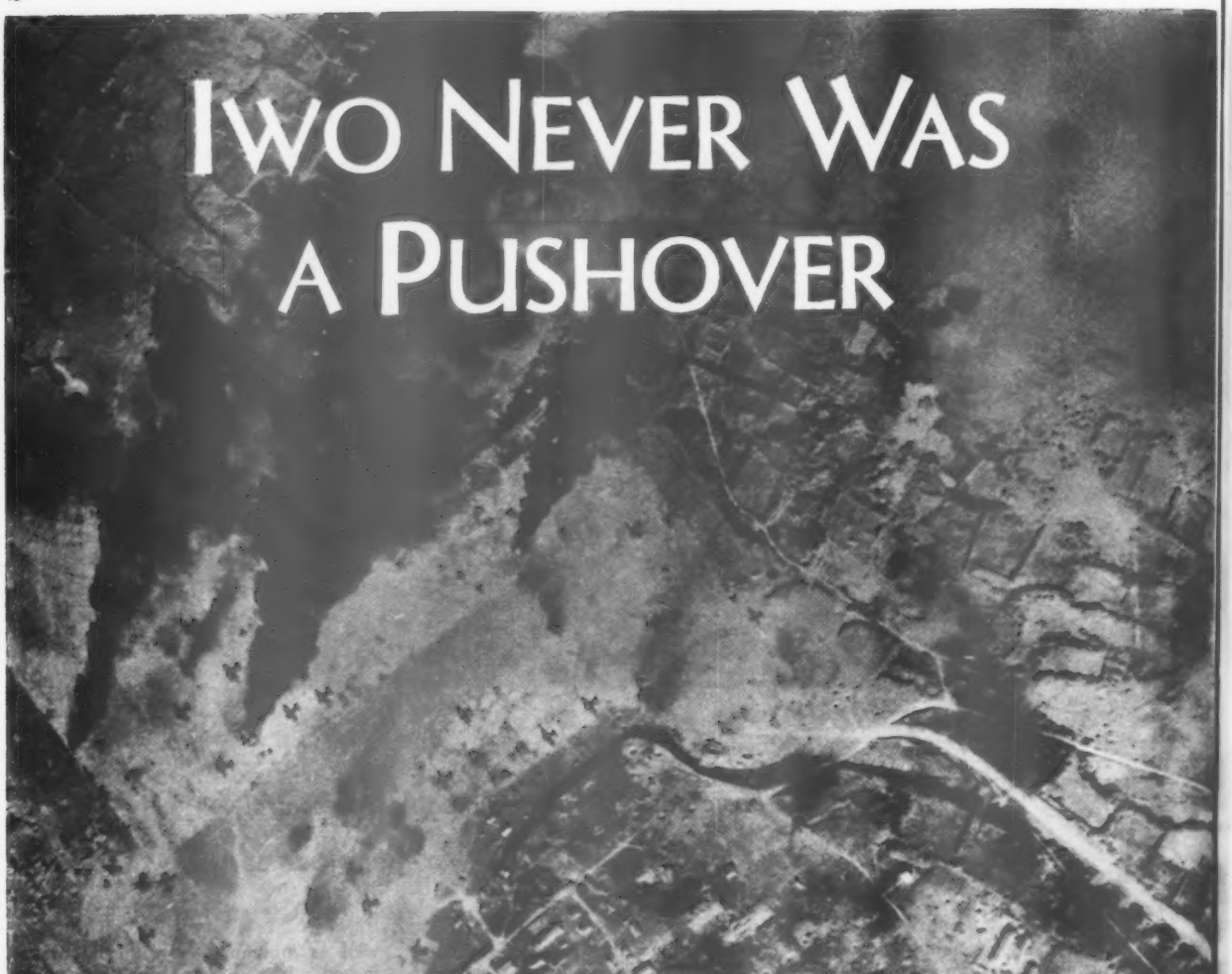


Diagram of present Ercoupe control system shows how rudder, ailerons and nose wheel are linked.

IWO NEVER WAS A PUSHOVER



Burning planes on one of Iwo Jima's airstrips attest accurate bombing by Naval pilots of famed Task Force 58.

By Lieut. KENNETH CLAYTON, USNR

Long before Iwo's invasion Navy pilots knew it was tough. Here's their story.

"I KNOCKED down four and I've got 30 more cornered," radioed Lieut. Paul M. ("Pablo") Henderson, of Lakeland, Florida. Unwittingly he foretold the story of eight months of ruthless warfare which were to rage over Iwo Jima. From that day—June 15, 1944—on, American forces assigned to polish off the Iwo Japs always found "30 more cornered" there.

Americans now know all about little Iwo, sometimes called Sulphur Island, for which Japan fought with a ferocity hitherto unparalleled in World War II. Americans of the future will know about it, too. Iwo's name was written into history, during February and March, in the blood of the U.S. Marines. Twenty thousand Marine casualties attest to the strategic importance of the island. Yet almost no one had heard of it when, on June 15, 1944, fast carriers from Task Force 58 slashed through Japanese waters well within range of Tokyo's land-based bombers to open the battle for Iwo. Bigger news that day was the invasion of Saipan . . . or the nine-day-old invasion of Europe.

Few noted a second stab at the little Iwo bastion nine days later—the battle of the Eastern Philippine Sea still was the headlines. But it was on June 24 that Japan proclaimed to the world that she would back her volcano-island Gibraltar to the limit. It was on that day that the Battle of Iwo really developed into the American aerial offensive without which the island bastion could never have been taken.

American Naval forces first clashed with the determined defenders of Iwo on June 15, when two fast task groups from Task Force 58 neutralized Japanese bases on Iwo and on Chichi Jima in the Bonin Islands to protect the amphibious forces going ashore on Saipan, 750 miles to the south. Heavy and light carriers carried out that hazardous assignment, accompanied by a screen of fast cruisers and destroyers.

Flyers of these task groups had been engaged in the pre-invasion bombardment of the Marianas. They replaced damaged planes with a few new aircraft from nearby escort carriers and headed

north. By the morning of June 15 they were deep in Japanese waters, closer to the Japanese home island of Honshu than any sizeable United States surface force had ventured since December 7, 1941. An enemy of the United States would have to raid a site as close to the mainland as Bermuda in order to stage an attack of comparable daring against this country.

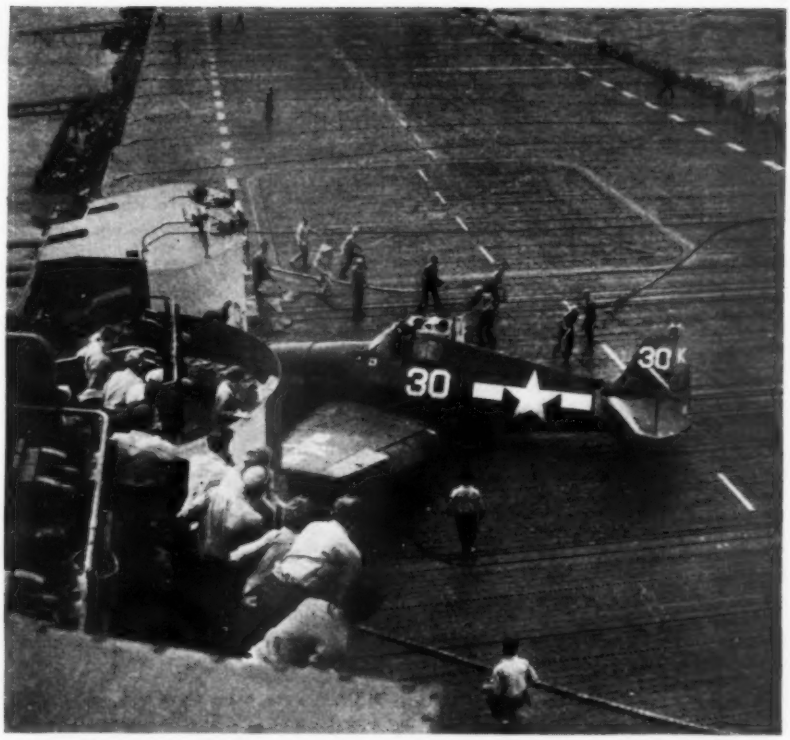
At noon, after a combat air patrol blasted the bow off a 1,900-ton Japanese freighter, the *Tatsutakawa Maru*, 30 miles away from the task groups, the presence of American forces in the Japanese waters certainly was no longer a secret. While destroyers gunned the freighter to the bottom and picked up 112 Japanese survivors, air strikes at Iwo and Chichi were launched from the pitching flight decks of the carriers in a threatening storm. Iwo was over 100 miles away.

Fighting Squadron One, headed by Comdr. Bernard M. ("Smoke") Strean, of Palo Alto, Calif., led the way toward Iwo carrying fragmentation bombs. A half-hour later fighters, dive bombers, and glide bombers were launched for a strike at Chichi.

Pure chance placed "Pablo" Henderson in position to open the bitter battle for Iwo, destined to reach its bloody climax eight months later. A balky fuel pump forced Lieut. Ed. Martin, of Stillwater, Okla., leader of Pablo's four-plane division, back to his carrier. Lieutenant Henderson went on in command of a three-man unit consisting of himself, Lieut. (jg) John Meharg, of Troy, N. Y., and Ens. Alden P. Morner, of Ironwood, Mich.

When Pablo spotted 40 Jap fighter planes over Iwo he couldn't wait for the supporting divisions sweeping in on either side. "There they are. Let's get 'em," he shouted, and dived on the Japs with Meharg and Morner following him in.

Meharg saw Pablo shoot down the first Jap plane. He and Morner later confirmed Henderson's four kills. What happened after Pablo reported that he had "30 more cornered," however, neither Meharg nor Morner knows.



Wounded, and with Hellcat's hydraulic system shot away, Ensign Morner belly-lands on carrier. Note damaged tail and hole in fuselage ahead of cockpit from Jap 20-mm. cannon shell.

"It was just like the movies," said the tall, blond Meharg later. "I made all the mistakes in the book, and I can't remember what all happened, but I got four of 'em. I musta made 12 passes. One blew up right in front of me and I practically flew through his plane. I had to chase the last one clear down to the water and I only had one gun firin'. Forgot I even had a frag bomb on till I was out of ammunition. I dropped it from an altitude of 3,000 feet and headed for home."

Morner scored two kills and a probable before a Jap 20-mm. shell pierced the cowling of his already riddled *Hellcat* and exploded almost in his lap. Morner suffered shrapnel wounds; his plane was smoking and streaming oil. A Jap pilot flew close to his wing and peered at the American pilot but concluded that Morner never could reach his carrier. The Jap executed a slow roll completely around the crippled *Hellcat* and went on

(*Continued on page* 128)

Comdr. Bernard ("Smoke") Strean, whose squadron opened Iwo battle.

Lieut. "Pablo" Henderson (left) fired the first shots in the Iwo air battle last June, but failed to return.

Lieut. John Meharg bagged four Jap planes on Iwo "opening day" battle.

The WARM FRONT

NEVER underrate the flight problems involved in warm front weather. There has been so much pilot scuttlebutt about the difficulties of flying cold fronts that there is a tendency to overlook the fact that *warm* fronts bring tough operating problems.

A warm front is produced when a surge of warm air from the south invades the region of the cold air of the north. It is usually associated with a low pressure system, projecting from its center like the spokes of a wheel impelled to move by the winds. In the northern hemisphere, winds blow counter-clockwise about a low pressure system; therefore the winds in the northeasterly sector of the low will be from a general easterly direction and the winds in the southern sector will be from a general southwesterly direction.

Warm southwesterly winds blowing up over the cold easterly winds cause warm front weather because, when most warm winds are lifted by the cold, clouds form and spread for many miles in advance of the front.

With the warm air overlying the cold, the resulting temperature inversion probably will cause many peculiar conditions of weather. Warm fronts bring many extensive cloud formations and practically all types of precipitation—rain, freezing rain, sleet and snow. Precipitation falling from the clouds in the warm air above into the cold air wedge below causes the cold air to become saturated with moisture, resulting in low-lying clouds forming in the cold air and bringing low ceilings and poor surface visibility.

EDITOR'S NOTE

This article is a condensation of the Navy booklet "The Warm Front," prepared by the Training Division, Bureau of Aeronautics. It is No. 5 in the Navy's aerology series and is reprinted here because of its simple, lucid treatment of a complex subject—aviation weather.

From the standpoint of the pilot, warm fronts bring three principal hazards. First of these is lack of surface visibility and ceiling. The second is icing, for there are two distinct sources of icing danger in the warm front area.

The third possible danger is that of running full tilt into a thunderstorm hidden by the cloud layers that surround the warm front. This hazard, however, is more remote than the ever-present dangers of icing and low visibility.

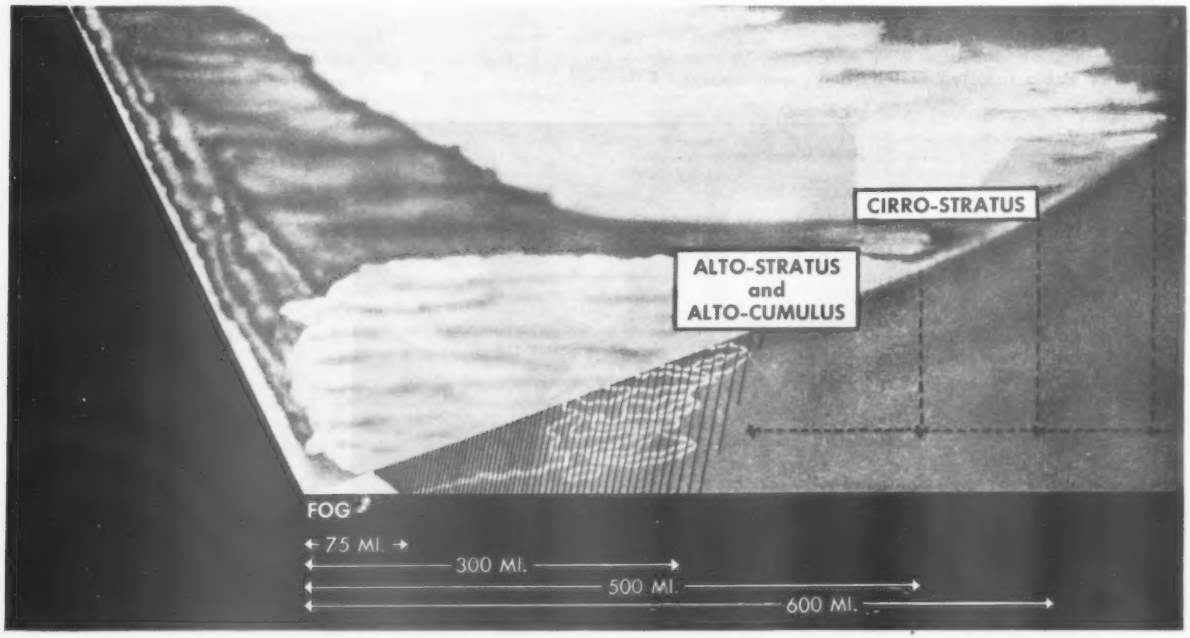
Warm fronts have this redeeming feature: they give you a warning when you are about to enter them. Extending over widespread areas in advance of the front are distinctive cloud formations which are as good as sign posts to the informed pilot, indicating what lies ahead. Then, too, there are significant shifts of wind and changes in outside air temperature to tell you when you have crossed the front. These are not so abrupt as in a cold front but usually they are quite noticeable.

Let's figure out what causes these signals. The slope of the warm front is very gentle, about one to 150, or one mile up for every 150 miles horizontally. The cold front is about one to 40—one mile up for every 40 miles horizontally. Therefore you have a much greater lift per unit of horizontal distance in the cold front than in the warm, and as a consequence, vertical currents and turbulence are more violent along the cold front.

In approaching a warm front, the first indication usually is a succession of parallel bands of cirrus clouds. Probably they will not be connected directly with the front, but they are its advance agents. Next you encounter an overcast of cirrostratus clouds which overlies and leads the solid cloud formations that comprise the front itself. The cirrostratus cloud deck does not obscure the sky but it gives a milky cast and throws a halo around the sun or moon.

If you find patches of cirrocumulus clouds in this area—referred to by old-time mariners as a "mackerel sky"— it is an indication that the over-running warm air of the front is unstable, meaning you are likely to encounter heavy showers or thunderstorms which might be imbedded in the warm front cloud systems.

Considerably below these cirriform clouds you find altostratus and altocumulus types at altitudes from 8,000 to 15,000 feet. These are the first cloud banks *directly connected* with the main warm



This front is moving from left to right. The warm front precipitation area may extend as far as 300 miles and clouds may precede the front by 600 miles. The warm air passing over a cold surface may cause a post-front fog which is highly dangerous.

Never underestimate the warm front. It may mean thunderstorms, fog, snow, sleet, or freezing rain with extreme icing conditions.

front surface. Their form varies greatly, depending upon the type of air which is over-running the warm front. If this air is stable, altostratus forms; if it is unstable, a turbulent deck of altocumulus combines with the altostratus. If the air is extremely unstable, scattered thunderstorms may be somewhere in the decks of altoform clouds.

As you continue on into the warm front zone, the clouds get closer and closer to the ground. The entire cloud system increases in thickness; the various intermediate and lower level clouds merge and stratus clouds may build all the way down to the earth's surface in the form of a fog so thick a landing is impossible. The warm front precipitation area may extend as far as 300 miles and the clouds may precede the front by 600 miles or more. On passing from the cold wedge of air through the warm front there will be a gradual transition from cold to warm air and a shift of wind. You are now in the warm sector of the storm.

The warm sector contains tropical air both at the surface and aloft. The air is warm and moist, and the sky generally cloudy. If any rain is encountered it will be in the form of a drizzle. The wind is fairly steady in direction and sometimes gusty. One general characteristic of a warm front is a wind shift from southeasterly to southwesterly when going through it from the leading edge. This wind shift can vary from 30° to 90°. The closer to the surface of the earth, the greater the magnitude of wind shift, and the higher, the less shift of wind. In comparison with a cold front, there is only slight turbulence.

Representative temperatures are higher in the rear than in advance of the front, and therefore the line of discontinuity is easily determined on the outside temperature indicator when proceeding through the front in either direction. The nearer you are to the earth's surface, the greater the temperature change will be. At 2,000 feet it may be as much as 20° whereas at 10,000 it may not be more than 5°.

When rain begins to fall from the cloud system associated with the front, lower clouds, irregular in shape, form in the air beneath. These lower clouds cause ceilings to be lower and the precipitation itself restricts surface visibility. Within a distance of 50 to 100 miles in advance of the front, the cold air is very shallow and in this area clouds generally lie on the earth's surface. It is then that we have "ceiling zero, visibility zero."

Because the clouds of a warm front are usually in layers, you can normally expect a smooth flight through them, since they lack the turbulent vertical currents. There are times, however, when scattered cumulonimbus clouds lurk in the cloud system and the thunderstorms can give you a rough ride unless your flight is planned so as to avoid them.

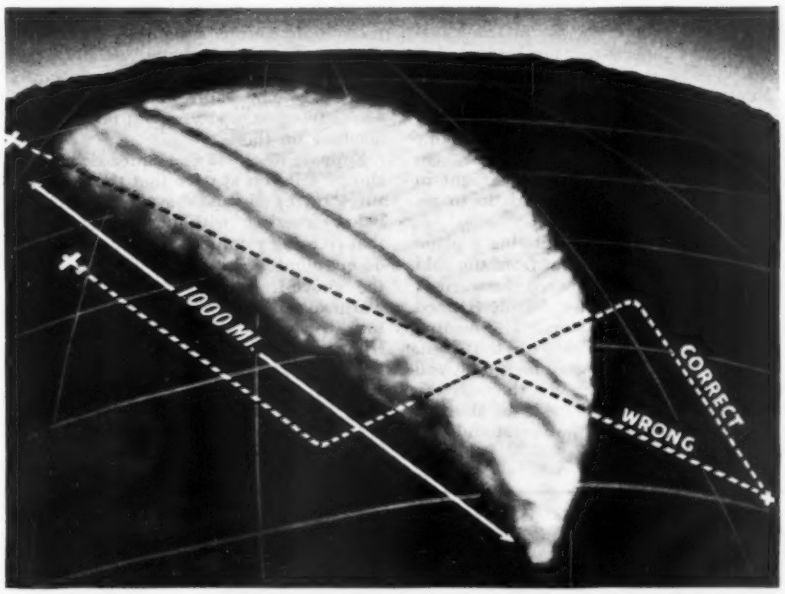


Diagram emphasizes importance of crossing the warm front at 90° instead of angling through it.

Warm front thunderstorms have higher bases and usually are less violent than those associated with cold fronts. Known as "high level" thunderstorms, they are a greater problem than cold front thunderstorms because of their ability to hide in the more benign formations and it may be difficult to select a flight path around them. If lightning is observed, it will be generally from cloud to cloud and not cloud to ground. These flashes are violet in color, whereas low level, or cloud to ground lightning, is a brilliant blue-white. The horizontal flashes make it difficult to locate the center of the storm because they do not illuminate the whole area and do not show a concentration in the core of the individual thunderstorms.

At the point where the base of the altostratus cloud formation is 8,000 to 12,000 feet above the ground, precipitation begins and becomes steadier as you get closer to the front. If the cold air associated with the warm front is unstable, instead of low stratus clouds and fog you will have usually a broken to overcast stratocumulus in the cold air, giving better ceiling and visibility in the precipitation area than if the air were stable. If you encounter intermittent *heavy* precipitation while flying in the warm front, it is an indication that thunderstorms or heavy showers are occurring in the warm air aloft.

During winter, in a typical warm front system, temperatures in the cold air are below freezing and temperatures in the warm air, in the lower few thousand feet, are above 32°. In the area where temperatures are below 15° the clouds are composed mostly of ice crystals and therefore only a light formation of ice is to be expected.

In areas where the temperatures are between 15° and 32°, the clouds are made up of ice particles and sub-cooled water droplets, the proportion of water droplets being greater at lower levels. These cause *severe* icing. That portion where temperatures are above 32° presents no icing problem.

The type of precipitation falling from these clouds and into the wedge of cold air below is determined by the temperature of the warm air front from which it falls. Under the area where the temperature of the warm air is above freezing, rain will fall. These rain drops will *freeze on contact with any object.* This is called freezing rain and presents the most serious of all icing problems.

Under the area where the temperature of the warm air is well below freezing, snow will fall. Snow presents no icing problem unless it is wet snow, which will stick to the plane and form ice at near freezing temperatures. In this case you should climb to an altitude where temperatures are colder and where snow will not adhere so readily.

Between the snow and freezing rain area is a relatively narrow transitional zone. In the upper portion of this zone is a mixture of rain and snow, while the lower portion is a mixture of snow and sleet. This change is caused by the freezing of the raindrops as they fall through a considerable depth of cold air.

Sleet is also found under the freezing rain area whenever the time of fall is sufficient to allow the raindrops to freeze in the air. Since sleet is small, frozen water

particles, it does not present a serious icing problem in itself but is a positive indication of a freezing rain condition above.

It is apparent that there are two areas in a warm front system that should be avoided like the plague. One is the low-lying cold air where precipitation is in the form of freezing rain. The other is in the clouds above the warm front surface where temperatures are between 15° and 32°.

Never accept the idea that you can't pick up ice in less dangerous areas, although there the accumulation is slow and doesn't cause immediate danger. On the other hand, if you prolong flight in these areas the ice may build up to serious proportions.

Let us assume you are piloting a plane and approach a warm front from the cold air side, that is, flying toward the warmer air. You first notice the sharply defined deck of cirrostratus clouds. The leading edge is roughly parallel with the front. If you are a qualified instrument pilot you can set your course to fly through the front at a right angle. This is the shortest route through the weather band and will cut down your time on instruments. In winter it will also keep icing down to a minimum. But if you are *not* an instrument pilot, there is but one course available to you, and that is to fly a course *away* from the front. If you elected to attempt to fly under the warm front, the possibility of encountering freezing rain is very good. This is one of the *extremely* dangerous icing areas. But if at the altitude you are flying you encounter freezing rain, you will know instantly that the temperatures above you are *above* freezing, and you will not ice your airplane up there.

Suppose next you encounter sleet. This should tell you at once that the temperatures in the clouds above you are at or below freezing, with positive assurance that freezing rain is above you—therefore do *not* climb. Sleet is the leading-edge of the above-freezing temperatures in the warm air of the frontal system. Therefore, if your course is parallel with the front, you can start a rapid descent if visibility warrants and low level flight seems at all possible.

Perhaps you fly into snow and suddenly also encounter sleet. This is a forewarning that freezing rain lies ahead and above you. Now you must make a decision immediately as to how you are going to avoid it. If conditions permit you can climb rapidly, but for the average pilot the safest alternative is—turn around and go back to your airport.

Whenever you are about to fly into a warm front area, give careful consideration to your flight plan before take-off. Think over carefully a series of "Don't's" beginning with:

Don't risk entering danger icing areas.

Don't plan sustained flight in areas where you may get only a gradual ice accumulation.

Don't underestimate the effect of ice on the performance of your plane.

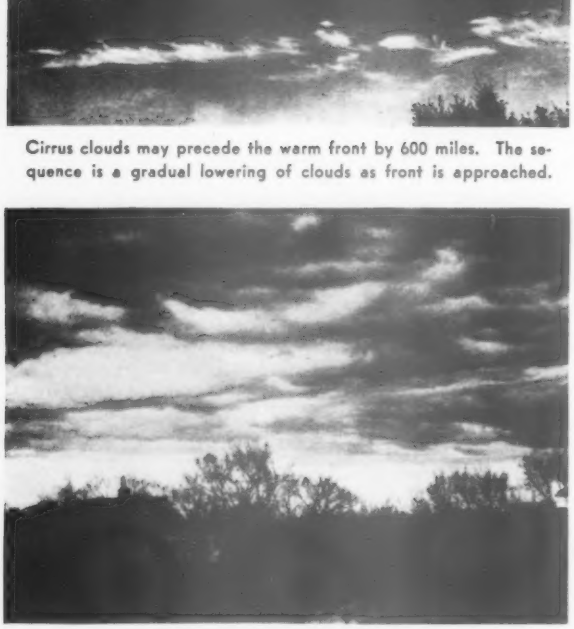
Don't take a chance of barging into a thunderstorm.

Don't be misled by any current report on ceiling and visibility at your destination. Conditions may change while you are en route. And last, but hardly least, if you are flying in a warm front area, *make sure* you have enough fuel to reach an alternate airport that is outside the warm front area if conditions should so demand. END

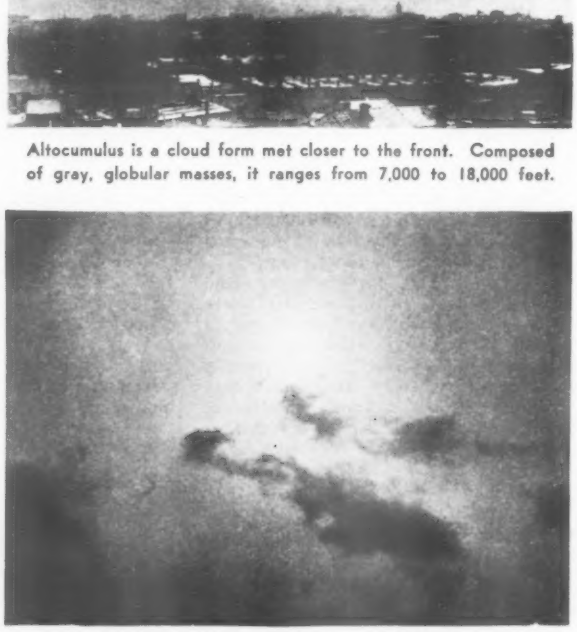
Sequence of Warm Front Cloud Forms

Cirrus clouds may precede the warm front by 600 miles. The sequence is a gradual lowering of clouds as front is approached.

Altocumulus is a cloud form met closer to the front. Composed of gray, globular masses, it ranges from 7,000 to 18,000 feet.



Stratocumulus clouds are lower, ranging from the surface up to 6,000 feet. They appear as long rolls, covering a large area.



With thin altostratus in background, rainfall plus low-hovering fractostratus clouds signify that the front is very close.

By FRED HAMLIN

THE other day we got more dope on job opportunities for returning veterans from an expert—Adam M. Butler of the Spartan School of Aeronautics at Tulsa, Okla., one of the members of the Aeronautical Training Society. Spartan has facilities for training a lot of students for aviation jobs, but Mr. Butler began asking himself whether there would be jobs after they got their training. He didn't know the answer so he went to the industry and for six months has been traveling up and down the land talking to personnel directors in all branches of aviation about present and post-war employment needs as they will affect veterans, including the handicapped . . . A great deal of what he has to report is not optimistic. Aviation manufacturing, for instance, is some 2,400 per cent expanded over what is expected post-war. Only the very skilled will be kept when the cut-backs come and there probably will not be enough jobs for them . . . Nor is the pilot situation going to be cakes and ale. Returning military pilots, besides having to meet stiff age and physical requirements, will find that they will have to take additional training before qualifying as airline pilots . . . Forty-seven per cent of all jobs in the transportation phase of aviation will be in maintenance, but mechanics home from the wars will also have to take basic courses, missed in their speed-up training, if they want to qualify as civilian aircraft and engine mechanics. [Also see page 26]

Silver Linings

The jobs, then—speaking generally—are going to be for men with civilian as well as military training. On the face of it, this is not exactly glad tidings for the GI who can see thousands of buddies getting home ahead of him for one reason or another, getting their training, and picking off the jobs before he's through with his fighting assignment . . . But, at least so far, this is not a factor. Butler finds that, while nearly half of the men in the armed forces interrupted their education to get into the fight, today only a handful are going back to school after discharge. Of some million and a half who have been discharged since Pearl Harbor, no more than 4,000 are now taking any form of Government-paid training. Three reasons are cited: patriotism has led many vets to take war-time home-front jobs regardless of futures; some have gone to work because of current high wage scales, and some have been poorly advised about their educational and vocational problems . . . Conclusion: veterans who return and take advantage of Government-paid schooling, carefully picking a field with a post-war future, should come out of school into an employee's market and get jobs that will last longer and pay better than their unschooled fellow-veterans and the untrained civilian competition . . . Mr. Butler, incidentally, hasn't quit getting all the dope he can on the situation which, as he pointed out, can change from time to time. If you want to ask specific questions, drop him a line.

Ernie Pyle's Report

March 28, Ernie Pyle told the story of how a Navy rescue ship sailed into the waters of Tokyo's outer bay to rescue a downed Navy airman, Ens. Robert Buchanan of Clementon, N. J. The ship passed within three miles of a gun-dotted island and within five minutes flying distance of land—and rescued not only Ensign Buchanan but another Navy pilot, a disgruntled Jap pilot, and a survivor of a Jap picket boat.

"That night I lay in my bunk reading a copy of FLYING magazine," Pyle continued. "It was the issue of last October, nearly six months old. It was the annual Naval Aviation issue.

"And in an article entitled 'Life on a Carrier,' on page 248, was this paragraph.

" 'It's a mighty good feeling to know that even if you were shot down in Tokyo harbor, the Navy would be in to get you.'

"It had never happened when that piece was written. But it has happened now."

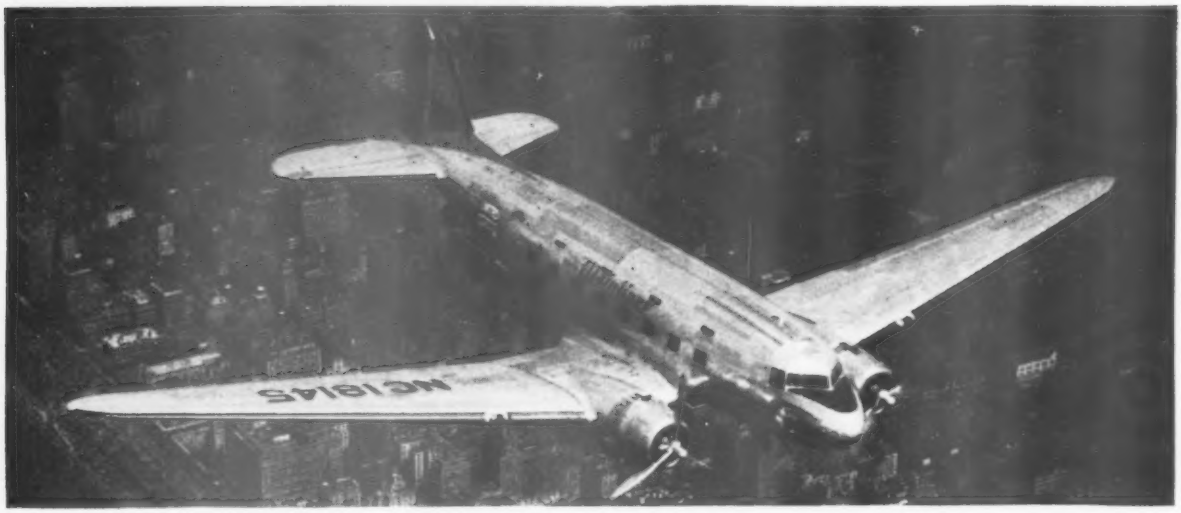
Norseman Air Transport

Speaking of returning veterans, here's a progress report on Norseman Air Transport's application before CAB for a franchise to operate a 77-stop airline serving six New England states and sections of New York and Pennsylvania. Norseman was formed by veterans for veterans only—the first concrete example of how air-minded and air-trained service men can work out their own post-war salvation. Idea for Norseman is based on a study of transportation facilities in New England by Robert G. Averill, former Syracuse University student, who is acting executive officer of the group . . . Norseman is fundamentally a young man's enterprise, ages of members ranging from 22 to 32, but it is youth tempered by experience and training under tough wartime conditions . . . One of the principal objections to such short haul air transport systems as the Norseman line is the distance of landing facilities from the communities served. Norseman will attempt to overcome that problem by resorting to water landings wherever possible. Of the 77 proposed landing areas, 29 would be water, much of which is immediately adjacent to community centers . . . Norseman plans to obtain all aircraft, parts and reserve equipment from Army and Navy post-war surplus stocks. Types of aircraft proposed for the Norseman operations include Noorduyn MK-4, Beechcraft 18S and 18R, Fairchild 24, Grumman *Widgeon*, Grumman *Goose*, and Bellanca.

R-d-r

It's cause for jubilation that the Office of Censorship has lifted the secrecy from radar, and it's equally good news that engineers recently received 10 carloads of radar appliances from Army and Navy at the CAA Experimental Station, Indianapolis, for post-war development purposes. Unfortunately there wasn't enough spare personnel at CAA to unpack the radar when it arrived, and although Don Stuart, CAA chief in charge of the proposed experimental work, has bright hopes, so far he has had no luck rounding up a radar expert to go to Indianapolis and get to work. At last word, a couple were promised from Army's Wright Field but had not yet been released . . . Money is another problem. Some $40,000 for radar work is in the CAA budget for the current fiscal year but it is doubtful if experiments can get far enough along to make much of a dent in that sum before the appropriation runs out July 1. Some $87,000 is promised for the coming year but it may not be enough to do what Stuart and his associates hope to do. . . . Two main objectives of the research are a perfection of screening devices which will permit tower controllers to visualize actual position of all aircraft within a radius of approximately 25 miles, and a collision warning device to be installed

(*Continued on page* 114)



New code demands that twin-engined craft, such as this DC-3, climb at rate of 100 feet per minute at 5,000 feet on one engine.

A NEW CODE

By
FRANKLIN D. WALKER
FLYING Associate Editor, Washington

Future world air travel demands universal agreement on civil aircraft codes and rules. Here is what recent conferences accomplished.

ONE of the most controversial sections of the agreement reached at the International Civil Aviation Conference in Chicago concerns a tentative code of airworthiness requirements for aircraft. There are strong indications that debate on many of its provisions may overshadow all other business at the first session of the conference's interim council in Montreal early in May. The protagonists in the controversy are Great Britain, the American aircraft industry, the U. S. Civil Aeronautics Board and the Air Transport Association of the airlines.

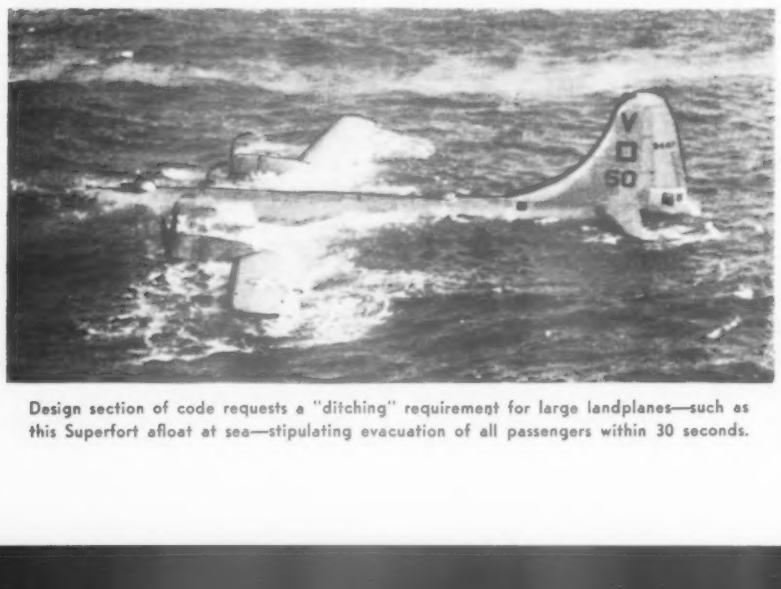
In broad outline, the picture shapes up about as follows:

1. Great Britain has taken a firm stand against the inflexibility of two articles of the code governing certification of airplanes and pilots.

2. The American aircraft industry feels that the code does not reflect its thinking and has demanded to be heard in Montreal.

3. The ATA fears the proposed international code may be less stringent than our own Civil Air Regulations and is preparing recommendations based on that position.

4. The CAB believes the code is a big step in the right direction, but admits changes are necessary before the document is presented for ratification by participating nations.



Design section of code requests a "ditching" requirement for large landplanes—such as this Superfort afloat at sea—stipulating evacuation of all passengers within 30 seconds.

A study of the list of differences between the international proposals on airworthiness and the current U. S. Civil Air Regulations reveals that the Chicago draft contains many desirable changes, but that others are objectionable to our airplane manufacturers.

In the non-air-carrier group, into which all personal planes fall, the major dissimilarity between the Chicago code and the CAR is in power loading. The Chicago draft recommends elimination of power loading and, to some degree, gross weight as items influencing design load factors.

In their stead, a category system would be set up in which design load factors would be arbitrarily specified, depending on the intended use of the plane. In other words, by adjusting gross weight and observing operating limitations, it would be possible for one airplane to be operated in all three categories—normal, utility and aerobatic.

While the category system would define the operating limitations of all airplanes, it also would place with the pilot

This Skymaster's landing speed now is governed by CAR rule for carriers of 80 m.p.h. or less stalling speed, which code would kill.

FOR AIRCRAFT

the responsibility for abusing them. At the same time—and this is highly important to lightplane owners and manufacturers—the category plan would give the pilot airplanes with greater utility by permitting him to exceed load factors. Manufacturers and operators of non-air-carrier planes will be gratified at the prospect of a regulation which recognizes more than one gross weight for each aircraft. In short, the new plan would sanction, say, a cross-country flight in an aerobatic plane at a weight greater than the design gross on condition that only normal flight procedures be used.

The international code also calls for a rate of climb in feet per minute of not less than 10 times the stalling speed in miles per hour, or 500 feet per minute, whichever is greater. Under CAR, the rate of climb for non-aircarrier planes is eight times the stalling speed in miles per hour, or 300 feet per minute, for land craft. This change is of doubtful value in the minds of some experts, although the higher rate of climb undoubtedly would increase the safety factor.

Dr. Edward Warner, vice-chairman of the Civil Aeronautics Board, points out that a number of private airplanes now in extensive use could not qualify under the higher rate of climb proposed. It is his view that the establishment of fixed limits of performance for private aircraft by Government regulation ought to be kept to the barest minimum.

Another part of the Chicago code on which there will be much discussion in Montreal is the section stipulating that all multi-engined aircraft, even though not in the transport category, must have a rate of climb of approximately 100 feet per minute at an altitude of 5,000 feet with one engine inoperative. Consensus appears to be that as long as single-engined planes are permitted to fly at all, the use of multiple engines will be a safety factor even if it does nothing more than stretch the glide after an engine failure. At worst, the twin-engined machine would be better off after an engine stoppage than the single-engined one.

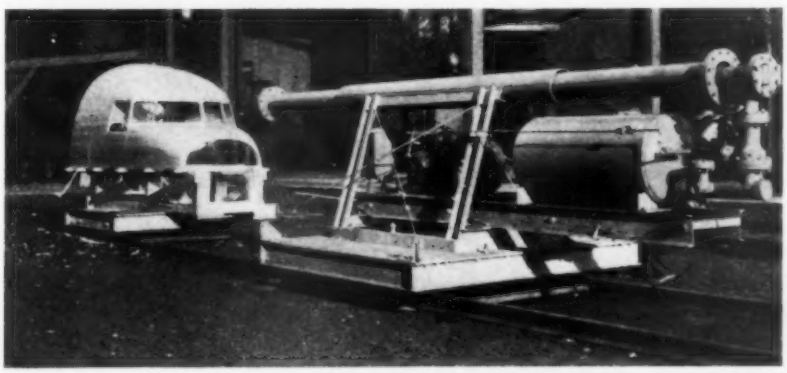
Manufacturers are particularly interested in Section 2.1210 of the international code, because it sets a 65 m.p.h. *stalling* speed for non-carrier types, rather than a 65 m.p.h. *landing* speed as now specified in our Civil Air Regulations. Such a change would be more severe on the manufacturer, since stalling speeds usually are slightly lower than the actual speed at which landings can be made.

Although the take-off requirements for transport airplanes in the new draft are substantially the same as those in the present CAR 04, the standard for non-carrier airplanes is changed to a distance of 2,000 feet to take off and attain a height of 50 feet and steady climb at 1.3 times the stalling speed. Our CAR merely establishes a take-off distance of 1,000 feet.

Of particular importance to the personal plane owner is Section 2.133 of the international airworthiness code. It would "require stability minimums for all strength classes of non-air-carrier aircraft." The Civil Air Regulations do not contain such requirements at present. The Chicago recommendation, the CAB believes, is important in connection with the category system because it guarantees the pilot an airplane that does not have dangerous characteristics over which he has no control.

Another controversial proposal in the code—one which manufacturers are in-

(*Continued on page* 134)



One code suggestion would require airliner windshields to withstand impact of five-pound bird at maximum speed. Tests were made with above mockup, air gun and fowl carcasses.

When You LEARN TO FLY-

GET A TOUGH INSTRUCTOR

Says

JOHN R. HOYT
Author of "Safety After Solo"

Nearly all accidents are preventable. The reason they occur is because of "soft" instruction, declares this long-time pilot.

NEWS items that tell of another plane crash no longer rate headlines or even double columns. But heart-breaking incidents which end in an "investigation," the write-off of the airplane, the loss of the pilot and his passengers, still occur. The real tragedy is that they are often preventable—most of them result from ignoring primary safety factors.

That statement applies to accidents in commercial as well as in privately-owned planes. And regardless of our growing safety record, there is reason to believe that these crashes are not "accidents" in the strictest sense of the word. An accident is something that takes place without one's foresight, says Webster, and that throws a different light on plane crashes.

Old-time instructors used to say, "There's no such thing as the unavoidable accident." Strong and all-inclusive as that statement seems to be, the fact remains that most aircraft accidents could be avoided.

For example, in a disastrous plane crash which occurred not long ago, the investigating board found that the pilot had *forgotten* to roll his stabilizer forward prior to take-off. Check-off list? Certainly—he just didn't use it, that's all. What and where was the reason for this asinine performance; who was to blame; why did he do it? There must be an answer somewhere—possibly away back in the pilot's *student* days.

Another example concerns a training plane that took off and flew into cumulonimbus, a thunderhead. It didn't look bad—a bit dark, of course, but ordinarily that meant just a few moments on instruments. The flight ended, however, with plane and pilot strewn over acres of ground. Why did the pilot do it? Surely he knew that cumulonimbus is dangerous. Could it be that some instructor had failed to impress him with the danger, the foolhardiness of trusting in luck, the unforgiving nature of aircraft?

A list of similar episodes could be endless, each example showing how easy it is to make a mistake in the air and how high the penalty is for so doing. The Navy has taught for years that it doesn't pay to change one's mind at the last minute; taught also that it is better to land wheels-up during a forced landing except in very rocky country. So what did a pilot do recently? You've guessed it—he put his wheels down to land on a certain spot, then changed his mind at the last minute. He turned, landed with wheels down, overturned, and nearly burned to death.

Why did he do it? Certainly he had been warned. But the warning had been, more than likely, a gentle admonishment, scarcely severe enough to make a momentary impression. And let no one dispute this statement: In aviation it is the lasting impression that counts. It is that subconscious fear of stalling that keeps one from stalling, that flashback to a face-burning reprimand that makes a pilot think before he flathats, that embarrassing memory of strong criticism that makes him keep on his toes instead of doping off.

Both students and instructors in this country have been schooled too long in the policy of the second chance. Anyone who has flown long enough knows that there is rarely such a thing as the second chance in aviation. Usually those who spin from stalls at low altitude die. Any who doubt it are referred to the voluminous records of the Civil Aeronautics Board which show that such spins are almost always fatal—and that most of the fatal accidents involve such spins.

Gravity is an unrelenting force and the "law" of gravity cannot be broken without payment of the penalty—with no probationary period for good behavior. So it goes for the rest of the rules in the flight game, from flying into bad weather to remembering the check-off list. A good pilot is one who has learned to obey and respect rules early in the learning sequence.

How does one learn? That would seem to be the crux of the matter. Unfortunately, the question cannot be answered,

Discipline is essential. There's rarely a second chance in aviation, the author insists.

(*Continued on page* 138)

OR TEACH FLYING . . .

UNDERSTAND THE STUDENT

Says
WILLIAM D. STROHMEIER
Hawthorne School of Aeronautics

A cockpit is a bewildering place to a new man, declares this seasoned instructor. The student may be frightened and confused.

SOMETIME ago I checked out in a 450-h.p. Vultee *Valiant* (BT-13). It made a new man out of me—at least as far as relations with my cadets were concerned—for by the time I had gotten the *Valiant* out of the pattern in a wobbly, uncertain sort of way, I came to the unexpected conclusion that students are human too.

I committed a whole series of mistakes—some careless, some dumb, the same kind which any student would make. Some of them weren't big mistakes but at least they were wrong as far as "procedure" was concerned and I'm sure the check pilot used plenty of body English trying to correct for me. For instance, I was just getting myself organized after the take-off and thinking what a nice plane I had when I remembered about the tach.

"Don't let 'er get over 2,100 r.p.m.," my condescending check pilot had told me.

"Now, where in hell is that tach?" After roaming my eyes over the instrument panel a dozen or so times I finally find the elusive dial. 2,350! Back on the throttle, but not until that *Wasp Junior* in flat pitch has awakened the dead for 10 miles around.

That taken care of, how about the airspeed?—90 m.p.h. I think he said for a climb. Wow! 115—roll back that trim tab, get the nose up. In the meantime my patient friend in the rear cockpit has his mike in hand ready to give me hell—me with 3,500 hours of flying time under my belt, way under it.

I think I have things pretty well organized when I suddenly remember the pattern turn. "Want to start it at 300 feet? Now where's that altimeter? Oh yeah, over there by the airspeed indicator. What? 500 feet already? Couldn't be." But Kollsman's seldom wrong, and I suddenly remember that they wash students out for smaller things than being 200 feet off in the pattern.

Out of traffic and up to 1,500 I decide to level off. "Let's see, we cruise this baby at 1,900, I *think* he told me. Back on the throttle. Whatthehell? Throttle's practically closed to hold her down to 1,900." But that odd situation doesn't last long as I see the prop control knob jerk back from flat pitch to high (cruising) pitch and the tach drop back to 1,500. A look in the jiggling mirror shows a fed-up Joe in the rear seat.

Just about that time, I hear the interphone mike click on: "Don't forget, big boy, this ain't no kiddy car."

Back in traffic, I start worrying about flaps, can't remember how many turns, what glide, and a dozen other things. Finally as I swing around into the final approach, the corner of my eye sees that red prop pitch knob snap forward. "Don't forget to put 'er in flat pitch before landing," says that zenith of patience in the rear seat.

So went the first ride.

I haven't forgotten it to this day and as long as I don't I'll be a better instructor. All of these mistakes were not exactly carelessness, but rather the result of initial confusion in an airplane entirely different from any I'd flown before. The mistakes were human.

It isn't very difficult to carry that thought a step further. If I, with 3,500 hours of flying time, could make a lot of errors in merely flying a different type of airplane, why should students be expected to make even fewer errors when they start handling a contraption they've never been in before?

It's unfortunate that more instructors don't have this attitude. Instead, there seems to be the tendency among flying mentors automatically to bestow on any student the stigma of ignorance. This impression is due to the failure of instructors to put themselves in the student's place. They fail to realize that much of this new game is a bewildering complication of procedures which only time and patience can master. Especially with students who have had no previous flying time there is a complex of reactions which definitely slows up the individual responses of otherwise normal minds.

(*Continued on page* 144)

Discipline? Yes, says the author, but it must be accompanied by patience and understanding.

By Maj. OLIVER STEWART

British Authority, Editor of Aeronautics

APRIL 1 marks the 27th birthday of Britain's Royal Air Force. On that day in 1918 the Air Force (Constitution) Act of the previous November was put into effect and the Royal Naval Air Service and the Royal Flying Corps were merged. These two were branches of the Navy and of the Army so that Britain actually moved from a two-service system, like that now prevailing in the United States, to a three-service system with a separate service for each of the elements of sea, land and air.

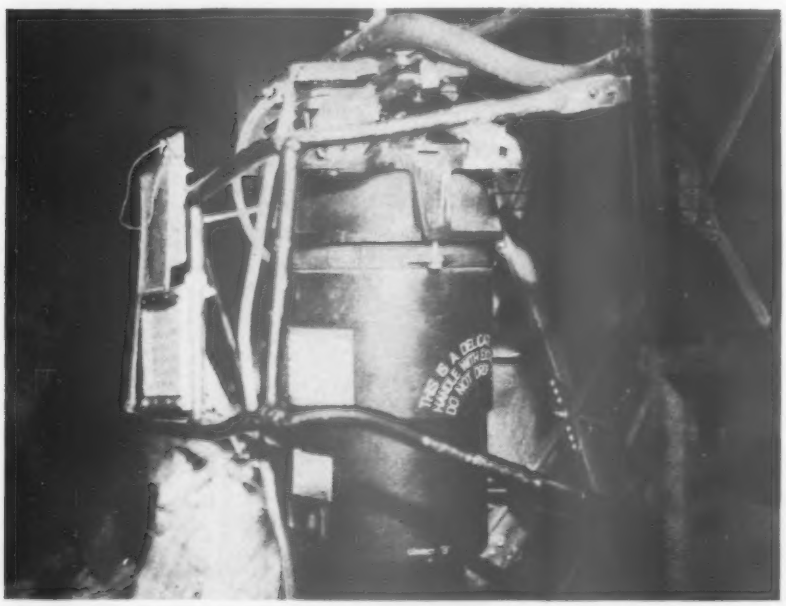
In the years between the wars the RAF with its light blue uniform and its rather clumsy rank titles gained the affection and the admiration of the people of Britain. They came to look upon the RAF as a sure shield against any new kind of attack that might be directed at England from the Continent.

The real test came soon afterwards. On Sunday, September 3, 1939, the wavering voice of Neville Chamberlain announced that Britain had been at war with Germany since 11 a. m. that day.

First RAF strike was the Wilhelmshaven and Brunsbüttel raid by Bristol *Blenheims*. It was made on German ships at masthead height and some of the *Blenheims* blew themselves to bits with their own bombs. It was such a small raid that nowadays it would hardly be reported. But the RAF was already growing fast. In May, 1942, the first of the 1,000-bomber raids was made—on Cologne. In January, 1943, Berlin had its first daylight bombing attack. In May of the same year the remarkable technical feat of the blowing of the Möhne and Eder dams was accomplished. In 1940 the RAF dropped 3,500 long tons on targets in Germany—in 1943, 96,000 long tons.

The growing strength of the Bomber Command also proved the effectiveness of the Fighter Command, which had held the enemy off factories long enough to allow industrial pressure to be stoked up. In the Battle of Britain, a still unbeaten record for the number of enemy aircraft shot out of the air in one day was set by the pilots of RAF Fighter Command.

These successes have had to be paid for. Total RAF casualties to this writing are near 100,000. Typical of the occasions when the RAF sustained heavy loss was the great night attack on Nuremberg of March, 1944. A clear sky, bright moonlight and a low layer of clouds gave the enemy night fighters their chance and 94 bombers were lost.



The master unit of the distant-reading compass, installed in an RAF flying boat

RAF Future

Will Britain adhere to the three-service system with a separate air force; will she revert to the American two-service system; or will she introduce an entirely new system? Your correspondent has expressed his views on this question in a recent book. With Gen. William Mitchell and Gen. Giulio Douhet, I believe that the only solution that will give aviation its full chance in every field of warfare is the single fighting force with co-equal departments within it for sea, land and air. In other words I believe in one fighting service.

This view has not had very strong support in Britain as yet. A vigorous opponent of it is Marshal of the Royal Air Force Lord Trenchard. But opinion among younger officers shows a trend towards the unified fighting force.

D.R.C. Origin

The idea of a magnetic compass stabilized or disciplined by a gyroscope (which is what the master unit of the Distant Reading Compass is) came from the late L. C. Bygrave, a civilian working at the Royal Aircraft Establishment. Other civilians who did some of the early experiments were W. J. Richards and H. C. Pritchard and with them was an RAF man, F/L (now Air Vice-Marshal) R. O. Jones.

There is speculation over here about whether the flux-gate type of compass will eventually oust the D.R.C. and so finally do away with the ordinary magnetic needle as the primary source of information as to the heading of the aircraft. Flux-gate compasses are American, the D.R.C. is British.

Air Circle

The British Circle of Aviation Writers (of which body your correspondent is vice-president) entertained Lord Swinton, the Minister for Civil Aviation, at a luncheon not long after his return from Chicago. Among its future guests is to be a man who is scarcely known to the wider public but who is regarded by those who know British aviation as aero-

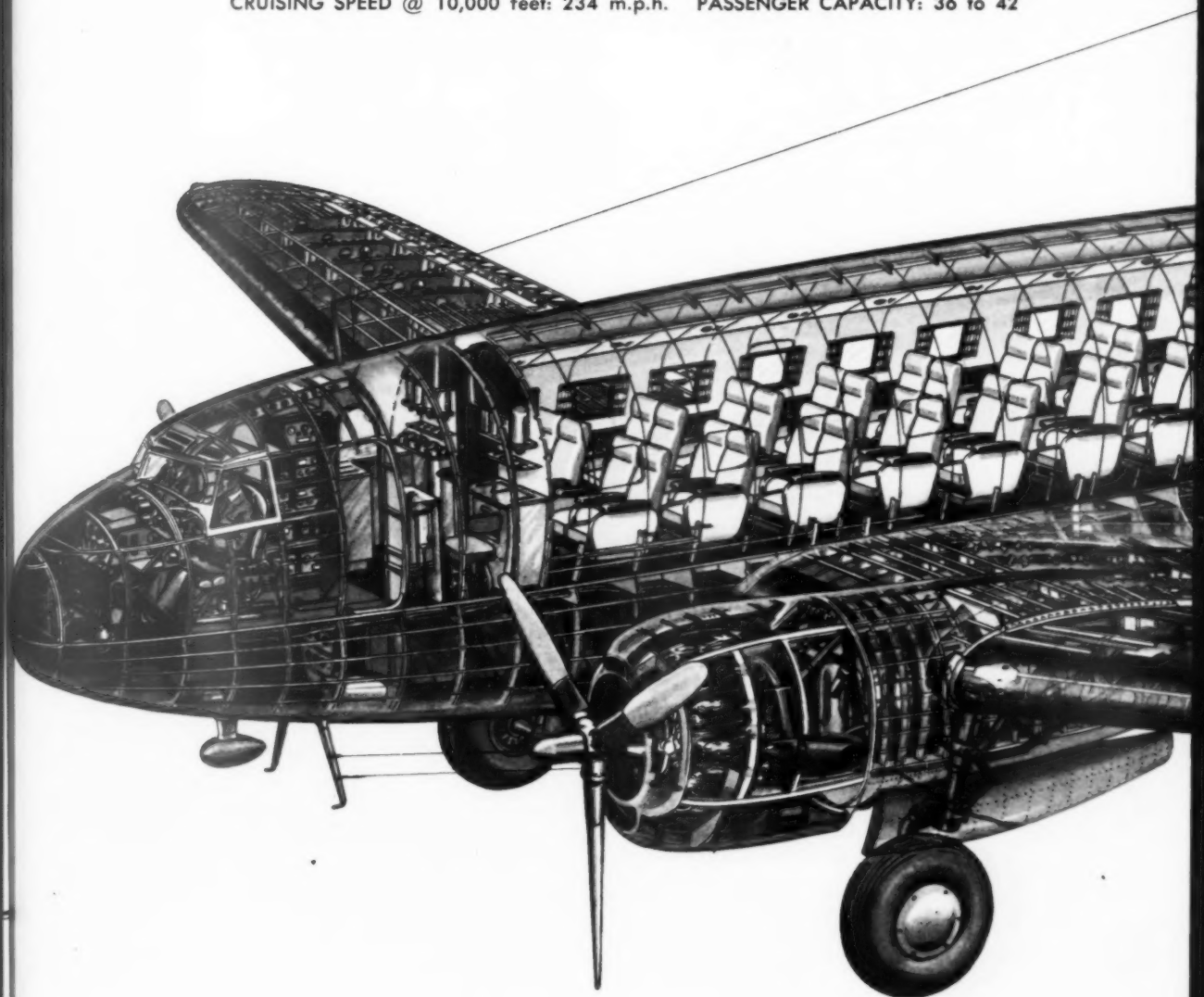
(*Continued on page* 119)

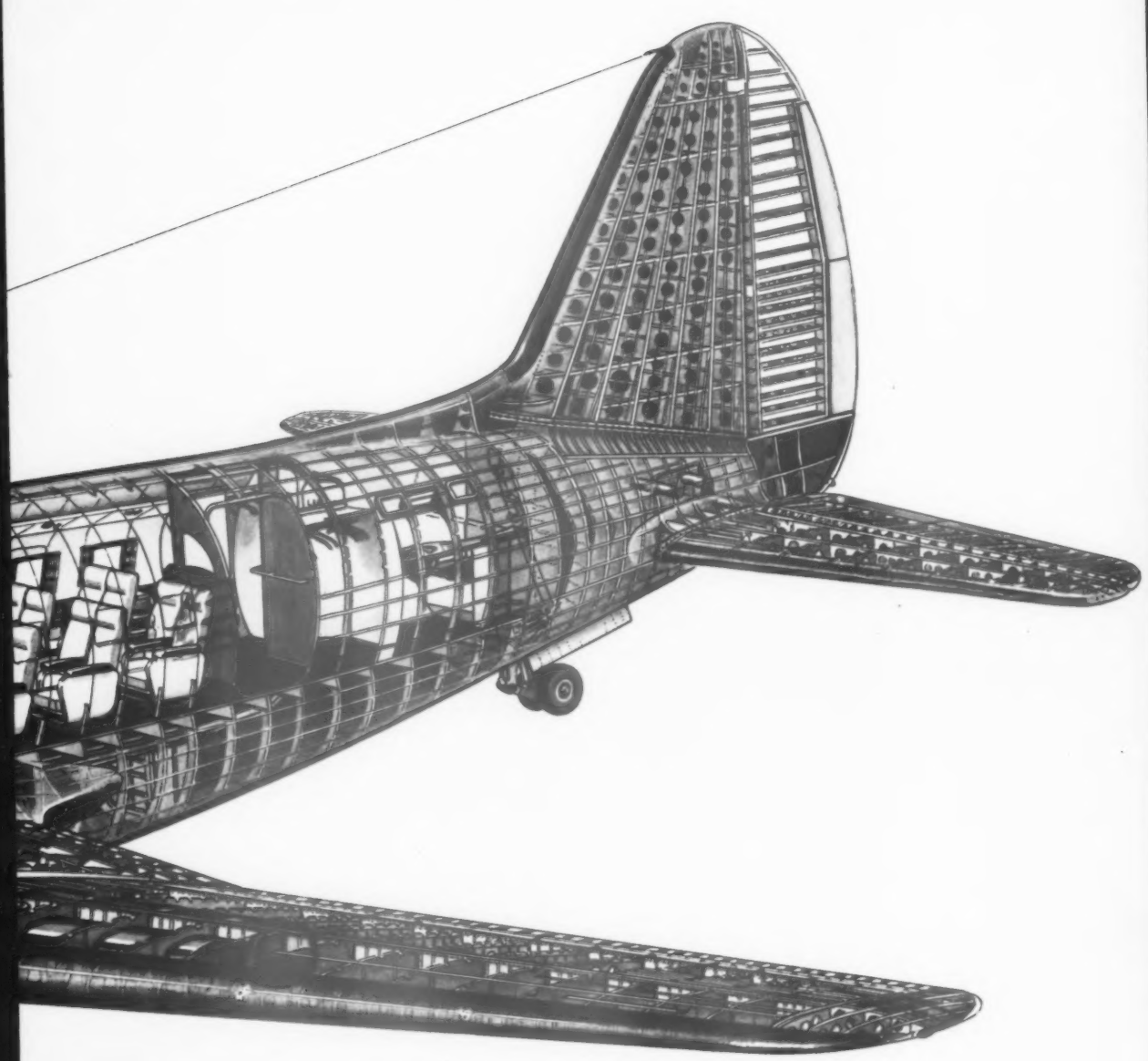
Cutaway drawing this month is the post-war Curtiss transport, the twin-engined CW-20E.

CURTISS COMMANDO

Two air-cooled Wright Cyclones, 2,100 h.p. each

WING SPAN: 108 feet
LENGTH: 76 ft. 3 1/16 in.
HEIGHT: 21 ft. 8 3/5 in.
TOP SPEED: 286 m.p.h.
CRUISING SPEED @ 10,000 feet: 234 m.p.h.
MAXIMUM RANGE: 1,520 miles
GROSS WEIGHT: 48,000 pounds
EMPTY WEIGHT: 32,100 pounds
MAXIMUM PAYLOAD: 12,430 pounds
PASSENGER CAPACITY: 36 to 42





FLYING
CUTAWAY

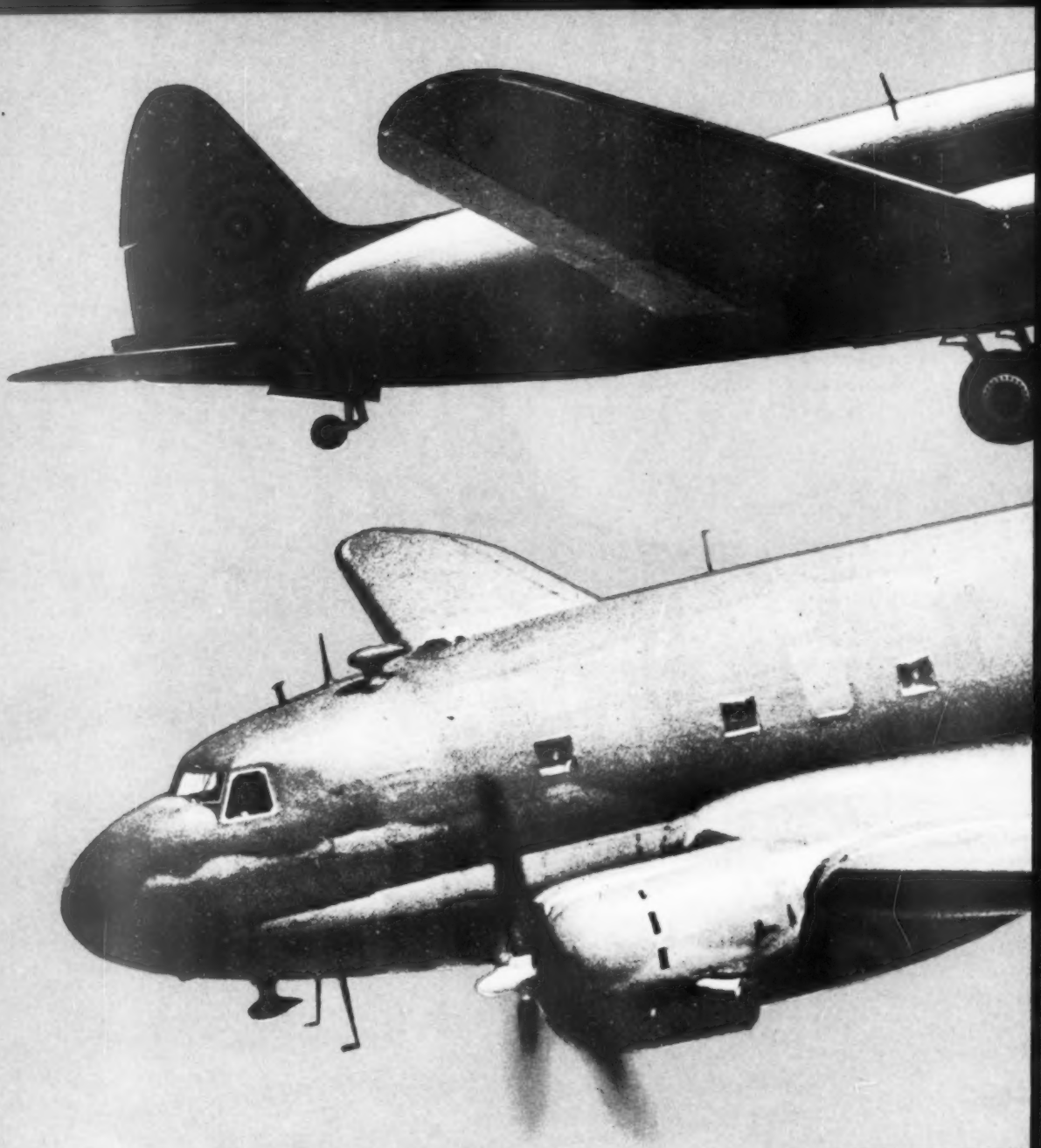
by

R. G. SMITH and R. J. POOLE

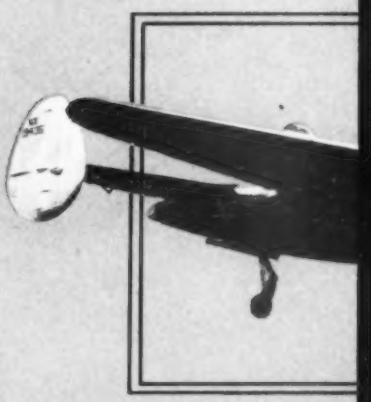
©FLYING, JUNE, 1945

OOLE

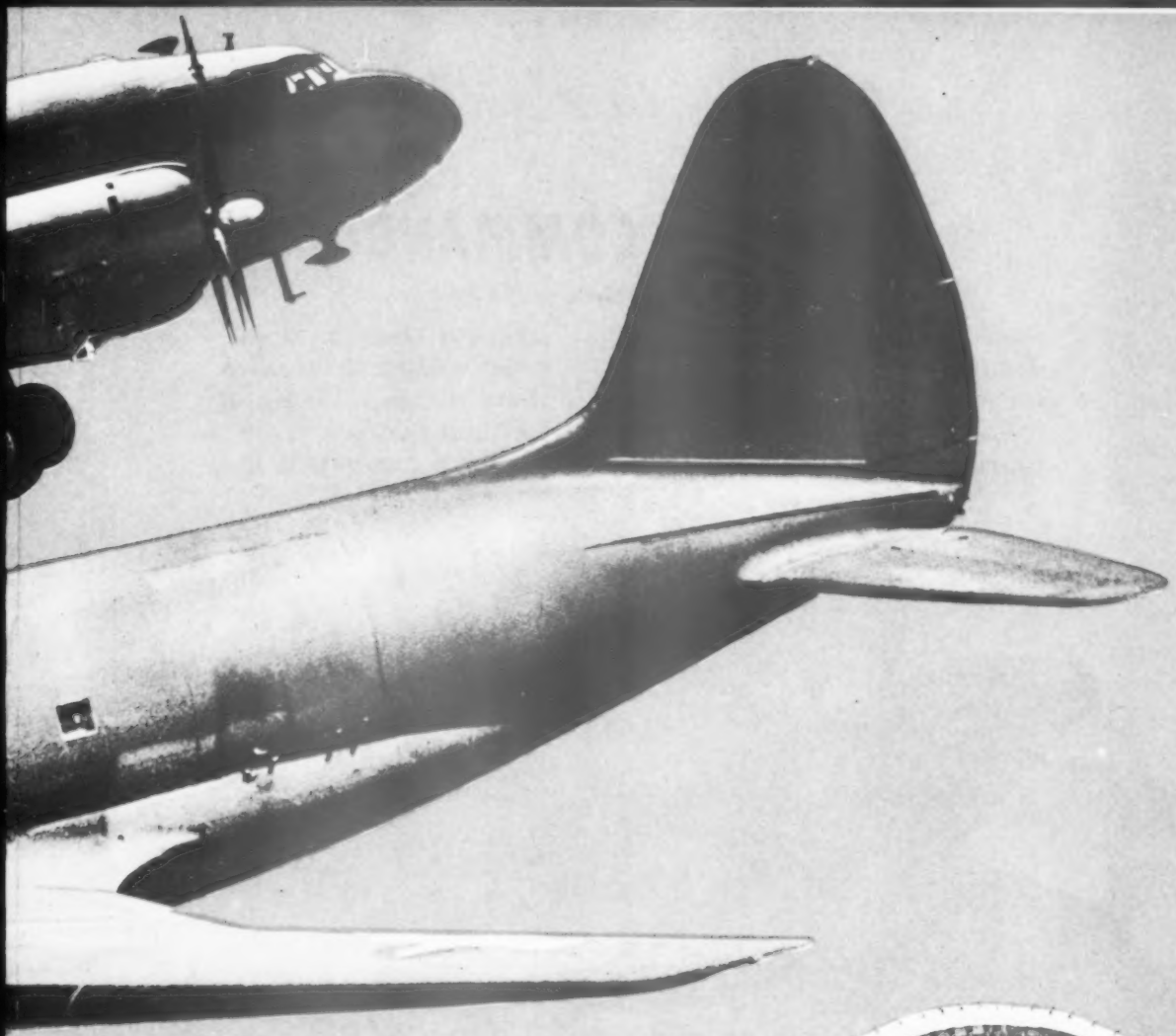
945

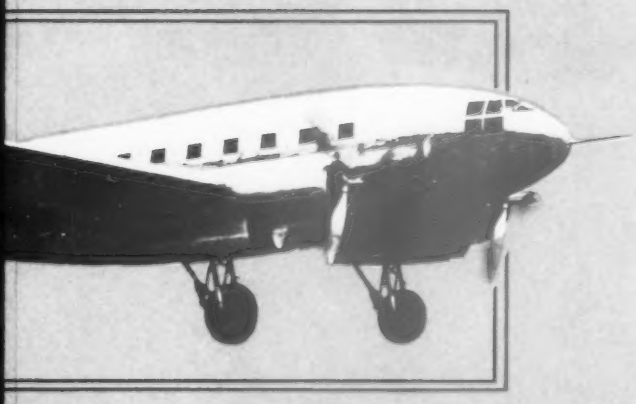


ANOTHER airline transport type that was converted to military use at the beginning of the war, the Commando will be a major post-war project of the Curtiss-Wright Corporation. Orders for Commandos already have been placed by several domestic airlines. They will use it on relatively short-haul, large-capacity runs, although the maximum range of the Commando actually is over 1,500 miles. At present, meanwhile, the Commando is used by the Army Air Forces as the C-46, and by the Navy as the R5C; the manufacturer's designation for the post-war version shown in the cutaway drawing on the reverse side is CW-20E. The first CW-20 flew on March 26, 1940. It then had twin rudders (see right). It now has the single tail unit, and the nose has been redesigned along more conventional lines. Unlike other post-war transport designs, the Commando will retain the conventional landing gear. The original CW-20 was sold to the British early in the war.

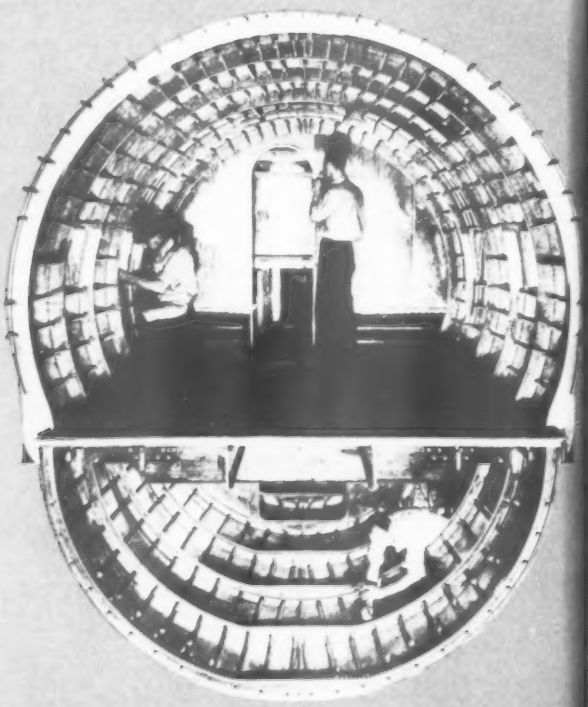


The original Commar





ndo design had twin rudders and smooth, faired-in nose.



Cross-section of fuselage shows large cargo compartment under cabin.

EIGHTH AIR FORCE FORT CREW STUDIES TARGET MAP BEFORE BOMBING MISSION.

BRIGHTLY-PAINTED HELLCAT IS BELIEVED A SPECIAL GUNNERY TARGET.

. . . faster firepower brings them back

Precision performance of Hughes Heavy Duty Ammunition Boosters and Flexible Feed Chutes provides the advantage of faster firepower for the guns of our aerial warriors.

Combat advantage is the primary objective of Hughes Armament engineers in designing scientific armament installations.

Hughes Aircraft Company

A DIVISION OF HUGHES TOOL COMPANY • CULVER CITY, CALIFORNIA

XUM

EXPERIMENTAL POST-WAR GENERAL SKYFARER HAS 125-H.P. ENGINE.

Black Widow embodies a step forward in designing a better WORKING WING

The wing is the *lift* element of an airplane — nearly all else is *drag*. By increasing the versatility of the wing — giving the wing more jobs to do — other non-lifting elements can be reduced in size or cut out entirely. Result? More efficient aircraft.

The Northrop-developed retractable-aileron is a step in this direction. With retractable-ailerons and the full-span flaps thus made practicable, the hefty, speedy Black Widow airplane, for example, becomes as easy to handle as a plane half its size . . . able to hover in the air, turn like a fly and slow down to land on exceedingly small air strips.

Count on this Northrop advancement to help future wings do the work of peace. Whatever shape aircraft may take — whether with fuselage or with payload carried in the wing itself — the principle of retractable-ailerons and full-span wing flaps will be usable. They'll be part and parcel of better working wings that will bring greater safety, maneuverability, more economical operation. Northrop Aircraft, Inc., Northrop Field, Hawthorne, California. Member Aircraft War Production Council, Inc.

which permit heavy fast planes to take off

QUICKER

TURN TIGHTER

LAND SLOWER

NORTHROP *Creators of the* ***Flying Wing*** *and the* ***Black Widow*** *P-61 Night Fighter*

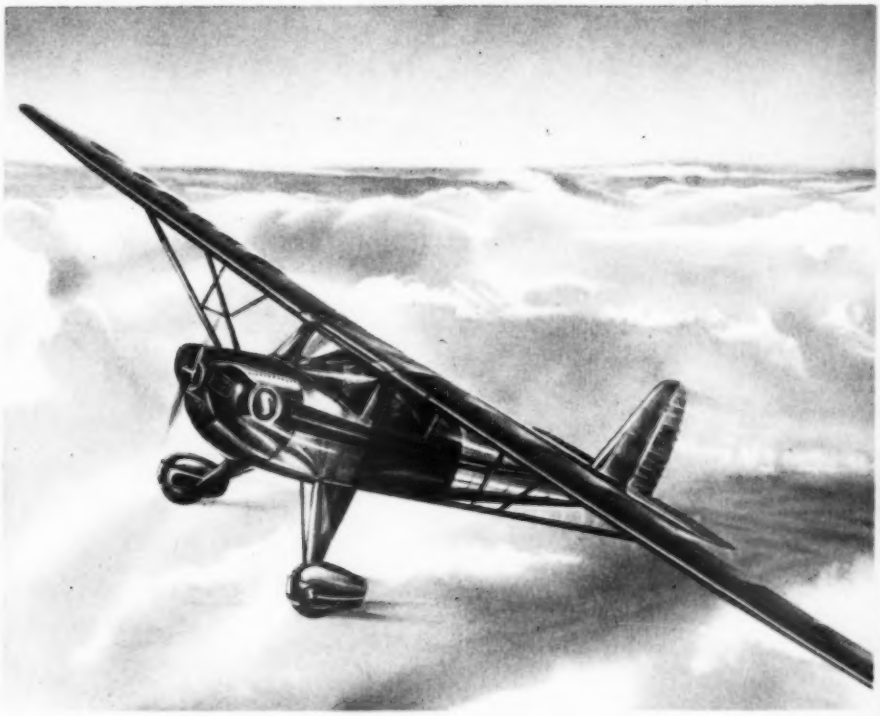
EXPERIMENTAL POST-WAR GENERAL SKYFARER HAS 125-H.P. ENGINE.

XUM

HAWKER TEMPEST, 435-M.P.H. BRITISH FIGHTER. TEMPESTS SHOT DOWN 600 V-1 BOMBS.

"This Baby's ALL METAL...

and that's what I want when I buy my own!"



Why is it that almost every fighter plane in the air today is an all-metal plane?

Not, certainly, because it's *cheaper* to provide the tremendous "plus" of all-metal construction.

In a military plane—as in a personal plane, like the Luscombe SILVAIRE—all-metal construction means greater built-in strength and durability . . . sleek streamlining that adds miles per hour to cruising speed . . . and *all-important economy of operation.*

So look to Luscombe—pioneer builders of all-metal personal planes—for a thrilling postwar version of the dependable, sturdy SILVAIRE, long noted for its top-flight performance, *low maintenance cost*, and high resale value.

This gleaming, breath-taking SILVAIRE will be an economical, safe, family plane—an airworthy, all-metal plane you can afford and be proud to own and fly.

Would you like more details? Simply mail the coupon.

★ ★ ★

Today our job is war . . . the production of vital all-metal parts and metal sub-assemblies for many of the United Nations' most famous war planes. After Victory, our wartime experience, plus our years of pioneering in aeronautical all-metal fabrication, will be translated into a dazzling new SILVAIRE, finer than you ever dreamed a personal plane could be!

LUSCOMBE AIRPLANE CORPORATION, TRENTON 7, NEW JERSEY

JBL Co.

SILVAIRE

America's ALL-METAL Personal Plane

BY LUSCOMBE

LUSCOMBE AIRPLANE CORPORATION
Trenton 7, New Jersey

☐ Please tell me more about the SILVAIRE.
☐ I'm interested in a Luscombe SILVAIRE dealership.

Name_____

Street_____

City_____

XUM

42343
7336
42355
Z841
220937
7325

Wide (7' 6") tread and the large wheels and 6.00x6 tires give exceptional ground stability. The new type hydraulic brakes are designed for quick, low cost servicing without removing wheels.

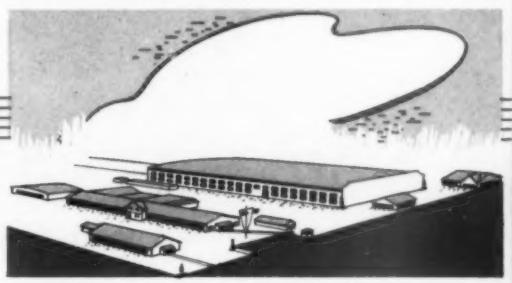
Enjoy the Safety of the *Swifts'*

Hydraulic Retractable Landing Gear...

Choose the economical new ***Swift*** for your personal plane and enjoy the advantage of big-plane features ... one of which is hydraulic retractable landing gear, sturdily built and designed with ***three*** safety features: (1) red and green lights on instrument panel indicating position of each wheel, (2) auxiliary manual mechanism for lowering wheels, (3) spring loaded pins that automatically lock wheels in down position.

Struts are hydraulic with steel cushioning springs ... and long enough and at sufficient angle to throw the wheels well forward with weight on the sturdy tail wheel ... giving extra stability in landing on rough ground or when brakes are applied quickly. Standard size 6.00 x 6 airplane tires help make landings safe and comfortable ... and the extra sturdy shock-strut tail wheel, a special ***Swift*** feature, makes smooth landings easier and helps the ***Swift*** taxi smoothly.

You'll be proud of your ***Swift*** and you won't be satisfied with a plane that offers you less than the ***Swift's*** many advantages. The ***Swift*** will be ready soon after conditions permit the manufacture of personal airplanes.



The Swift

Made by GLOBE AIRCRAFT CORPORATION Fort Worth, Texas

Illustrated booklet sent on request. Write to P.O. Box 4277-F Fort Worth 6, Texas

XUM

Aeroprops will save places for two

This Propeller's Battle-Tested Lightness Will Be a Payload Factor Soon

WHETHER it's a happy honeymooning couple, or less romantic payload, the pounds Aeroproducts has trimmed from propeller weight will make possible this additional plane capacity for peacetime flying.

Lightness is not the only factor that recommends this General Motors propeller. Its automatic, constant speed operation, simple unit construction, and ribbed-steel hollow blades are among the many features important to flying's future.

Like all General Motors products, the Aeroprop is the result of intensive research, engineering, and production developments. Built to more than meet war's demanding standards, battle-tested on every front, it will be ready to contribute equally to the progress of peacetime flight.

Today the Aeroprop serves flyers who have "dates" with Victory. It will serve tomorrow's honeymooning couples—and others who fly—with the same efficiency.

Aeroprop Advantages—*Lightness* for payload . . . *Strength* for safety . . . *Simplicity* for easy service . . . *Faster Automatic Pitch Change* for flight efficiency . . . *Full Feathering* for engine protection . . . *Engineered* for reliability.

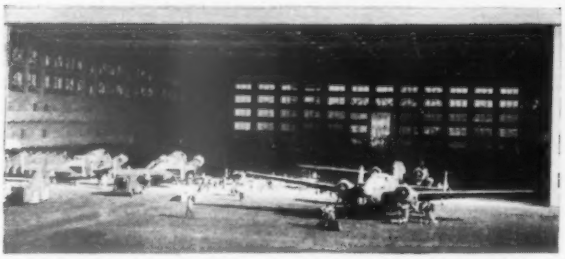
Aeroprop

LIGHT • STRONG • RELIABLE

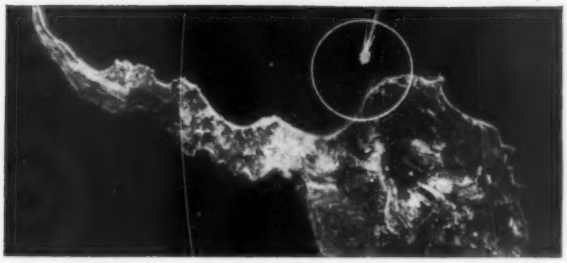
AERODUCTS DIVISION • GENERAL MOTORS CORPORATION • DAYTON, OHIO

Keep them flying—Buy Another War Bond!

Have You Seen?

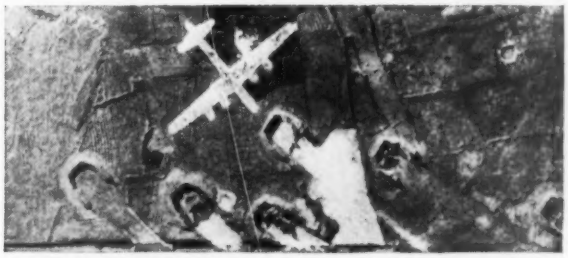


Airplanes standing in hangar door apparently are Lockheed Harpoons (PV-2), Ventura successor. Note long wings, new rudders.



An AAF Liberator over pollywog-shaped Corregidor caught a Jap naval vessel in its bombsight, neatly planted one bomb on deck.

RY-3, transport version of Privateer, carries 28 passengers and crew of four. Gross weight is 60,000 pounds, range 3,000 miles.



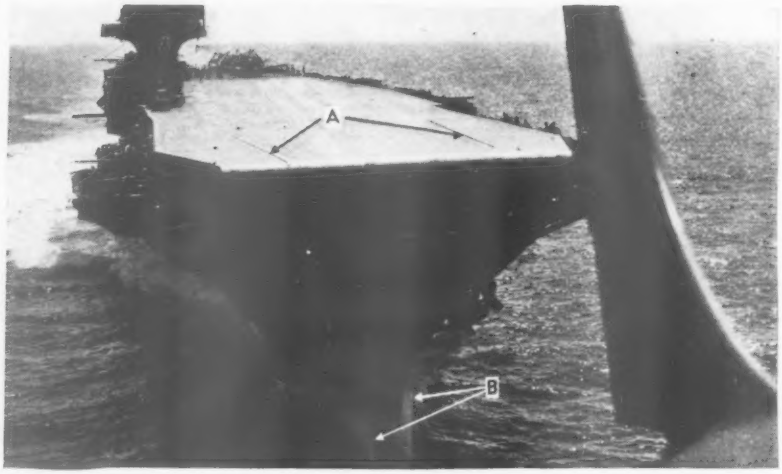
B-29 with flaming No. 2 engine is a Jap aerial booby trap outlined on ground. Nearby guns would fire on "rescuing" AAF pilots.

New rocket-firing Mosquitoes with eight 60-pound rockets have firepower of six-inch cruiser. Rockets above are armor-piercing 25-pounders.

HAVE YOU SEEN?

CONTINUED

The Ryan Dodo is an old Navy NR-1 with a small nose wheel. It is for taxiing training.

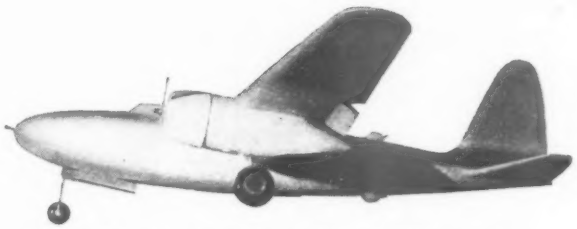


This interesting view of a U. S. Navy carrier shows its two deck catapults (A) and two paravanes (B), underwater protective devices with sawlike teeth to cut loose mines ahead of bow.

Sprait controllable wing is being tested on radical four-wheel plane. Prop is on shaft from engine. Wing span is 26 ft. 6 in.

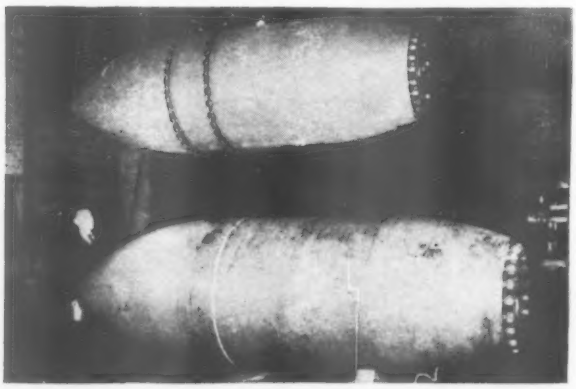
Chrislea Ace is a four-place British plane with 90-h.p. Franklin. Cruising speed is 105, range about 380 miles. Price: $1,903.

This British Barracuda knocked off tail wheel (arrow) on deck of carrier, jammed rudder. Pilot flew off, ditched, was saved.



This model was displayed recently at a St. Louis aviation show. It is a twin-engined, tricycle-geared bomber. Note two turrets.

The Barkley-Grow transport Admiral Byrd used at the South Pole was given to University of California, later was junked (above).



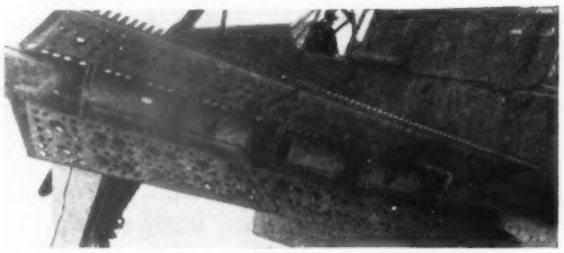
Britain's giant 11-ton bomb is shown here, with smaller six-ton bomb hanging above it. Six-tonner is bomb that sank the Tirpitz.

One of the first photographs to be released of a Grumman Hellcat fitted with the Navy's latest type rocket and launcher. Hellcat carries six rockets. Note rocket tube with missing warhead.

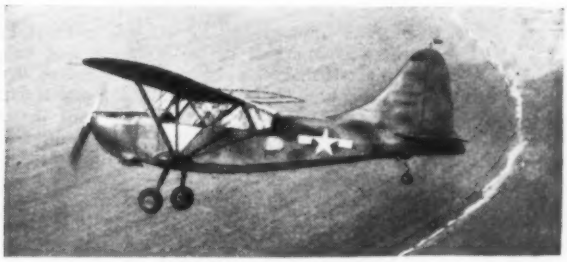
Shore-based ground crewmen chalk notes to carrier-based pals on a Corsair propeller

Latest Eastern Aircraft (General Motors) Avenger is TBM-3. It has rockets and ball-like radome on wing. Rear turret has been dropped.

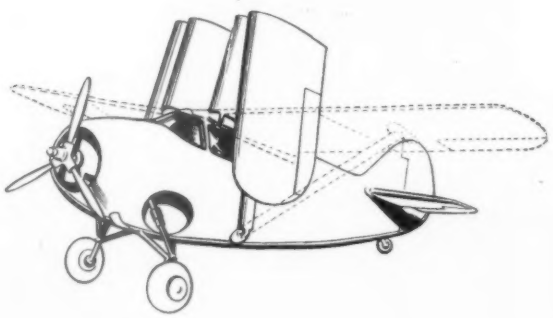
Small white ball under this Fortress's fuselage, replacing the standard ball turret, is a radome housing for the B-17's radar.



These are the perforated flaps on the latest Curtiss Helldiver, the SB2C-4. They are shown extended as they are used in diving.



Circling over the beach at Saipan, this Marine Vultee Sentinel (OY-1) is used for patrol, observation and artillery spotting.

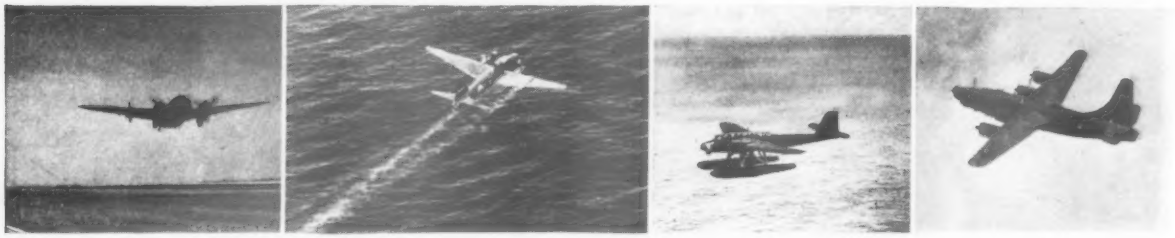


A new wing-folding system patented by Curtiss has wing fold in two places rather than along fuselage. Plane is an Owl (O-52).

New night-fighter version of the DeHavilland Mosquito has bulbous nose, probably housing radar. Armament is four 20-mm. guns.

XUM

FOR IDENTIFICATION



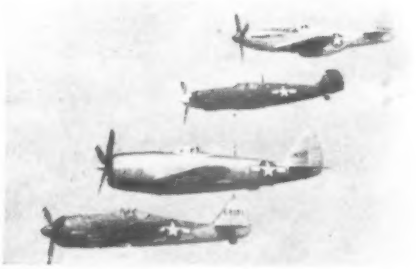
1 2 3 4

5 6 7 8

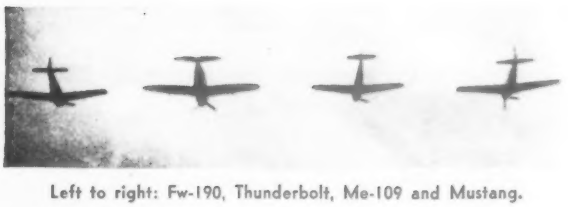
The planes are: 1. Lockheed *Hudson*; 2. Jap *Nate*; 3. Heinkel He-115; 4. Consolidated *Privateer*; 5. Douglas *Boston* (Hi-Speed); 6. Short *Sunderland*; 7. Martin *Marauder*; 8. Waco CG-13.

MISTAKEN IDENTITIES

THESE AAF photographs, taken at Eglin Field, Fla., offer an excellent comparison of two German and two American fighter aircraft that look alike. The American aircraft shown are the Republic *Thunderbolt* (P-47D) and North American *Mustang* (P-51D); the German types are the Focke-Wulf Fw-190 and Messerschmitt Me-109. While these aircraft differ considerably when inspected close-up, they resemble each other markedly when seen at a glance in flight. All types shown have frequently been mistaken in combat areas.



Top to bottom: P-51, Me-109, P-47 and Fw-190.



Left to right: Fw-190, Thunderbolt, Me-109 and Mustang.

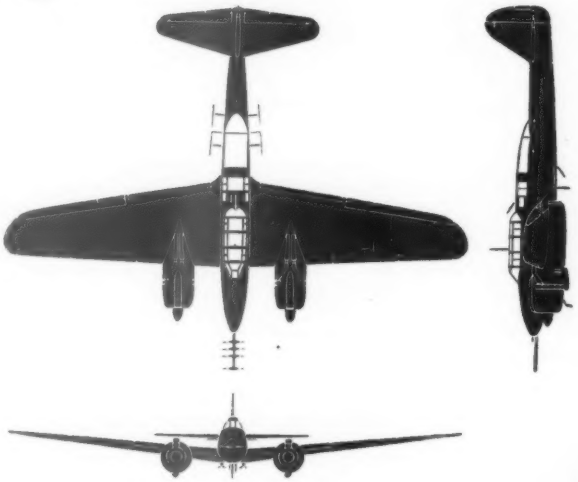
Left to right: Mustang, Me-109, Thunderbolt and Fw-190.

The frequently mistaken Mustang (left) and the Me-109.

The much larger Republic Thunderbolt (left) and Fw-190.

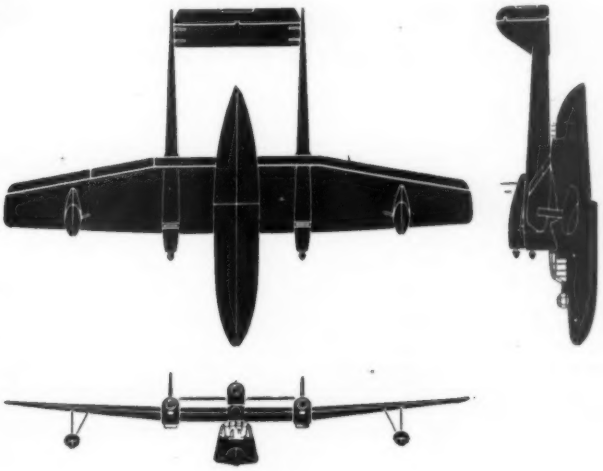
STINSON VOYAGER

This widely-used lightplane is powered with a 90-h.p. Franklin air-cooled engine and has seats for three persons, including the pilot. Wing span is 34 feet, length is 22 feet, height, 6 ft. 6 in. Wing area is 155 square feet. Top speed is 115 m.p.h. and cruising, at 75 per cent power, is 109 m.p.h. Service ceiling is 13,000 feet, range 380 miles (it carries 20 gallons of fuel). Empty weight is 948 pounds, gross is 1,625 pounds.



← IRVING

Originally a Jap reconnaissance bomber, *Irving* now is most often seen as a night fighter; this is the version shown in our silhouette. Powered with two 1,100-h.p. Nakajima engines, its top speed is about 330 m.p.h. Maximum range is 1,900 miles. Armed with a number of 20-mm. cannon, several are reported to be fired from the rear cockpit. Span is 55 ft. 8 in., length, 40 feet. Rods projecting from nose and fuselage are radar.



BLOHM & VOSS Bv-138B →

One of the few German flying boats still used, the Bv-138B has three Jumo 205C Diesel engines. Wing span is 88 ft. 7 in., length is 65 ft. 3 in. With a crew of five, this patrol bomber has a top speed of 171 m.p.h., cruises at 146 m.p.h. and 16 hours maximum cruising range. Wing loading is 21 lbs. per sq. ft. Weight empty is 17,820 pounds, gross weight is 26,180 pounds. This airplane is designed to be catapulted from ships at sea.

AIRACOMET DATA

Just released to FLYING by the AAF are the following facts and figures on the Bell *Airacomet* (P-59A). It is serving only as a trainer at the jet-propulsion flight training base at Palmdale, Calif. As a trainer it probably has been redesignated TP-59A; it is Bell Aircraft's Model No. 27.

Wing span is 49 feet. Length is 38 ft. 10 in., height is 12 feet. A single-place airplane, the *Airacomet* weighs 10,000 pounds fully loaded. Speed is given as "over 400," although a British source, as quoted on page 79 of the April issue of FLYING, gave the top speed as 575 m.p.h. Service ceiling is over 40,000 feet. Armament includes one 37-mm. cannon and three .50-cal. machine guns in the nose.

I Learned About Flying From That!—No. 68

By ALBERT E. PACINI

Mistaken for Army flyers at a new field, these CAP pilots got the jitters and forgot to refuel.

PRIVATE flying back in 1942 involved a pretty stiff routine for the pilot. No flights of more than two hours duration without two-way radio; no landings at undesignated airports; clearances and arrival notices at each airport—the average pilot did more paper work than actual flying.

The Civil Air Patrol was in its infancy. Brash young pilots were beginning to wear uniforms replete with CAP insignia —to say nothing of the gaudy but decorative red shoulder straps. Arnie and I had just been made second lieutenants and, decked out in CAP's best, we were all set to commemorate the occasion with an overnight, cross-country flight. We gassed up my 65-h.p. *Cub Coupe* and left Minneapolis for Sioux City, making our scheduled stop for gas at Spirit Lake, Ia.

We sighted Sioux City sometime near dusk and headed for the airport which we expected to be a moderate sized field with a few planes lazily droning around. We circled the field at 1,500 feet but there wasn't another plane in the air. A few planes were staked out on the ground near a short strip of concrete far to the south of the field. Bulldozers, tractors and a couple of trucks marked the only ground activity we were able to observe.

Twice around the field with our radio tuned to Sioux City frequency brought no answering call. The control tower paid no attention to us; no lights welcomed us to land. It was getting dark so on our third circle we lost altitude and went in for a landing on the south concrete runway. We made a low power approach, cut the gun and the Cub wheezed to a stop. The tower was about a mile away across a muddy field.

"Look over there," called Arnie.

I looked. "Over there" was a cloud of dust punctuated by splashes of mud left in the wake of a brilliant red truck. It was speeding toward us by the most direct route, through mud, over sandpiles, across uncompleted runways.

The truck whizzed up, brakes squealed; two soldiers jumped out, snapped to attention and saluted. We returned the salute questioningly. Suddenly it dawned on us that the Army had taken over this port and that the soldiers, unfamiliar with CAP uniforms and the CAP decals on the plane had mistaken us for Army officers.

"Er . . . where's the clearance office?" questioned Arnie. Obviously puzzled, one of the soldiers replied, "I suppose you mean the O.D., *sir*?" The "sir" was respectful; no doubt about it, we were officers.

"Is there hangar space for our plane?" I asked, hopefully.

"No hangars are open yet, sir, but we can stake it down." They wheeled the *Cub* gently in between a *Lightning* and a *Liberator,* the planes we had noticed from the air, and staked it.

We got in the truck and minutes later the driver pulled up in front of a newly constructed building. We stepped down from the high running board.

"The lieutenant is inside, sir," he said and drove off. We went into the low building and down the hall to what we decided was the O.D.'s office.

The O.D., Lieutenant Williams, informed us that our plane was the first to land since the field had been officially turned over to the Army the preceding day. All the time he kept eyeing our CAP sleeve patches, as though trying to remember to which outfit we "belonged."

"You men are liaison pilots," he announced finally, as though it had just dawned on him what the insignia meant. We didn't say yes—but we didn't say no. So the Lieutenant picked up the phone and called the officer's club in Sioux City.

"A couple of liaison men just dropped in in a Maytag Bomber," he announced. "What do we do with them?"

We could hear the reply.

"Are they Short Snorters? If they aren't save them for the officer's club!"

"Roger! I'll send them right in."

In Sioux City, the car Williams had provided for us stopped in front of a hotel. The driver held our door open, saluted as we stepped out.

"The officer's club is on the sixth floor, sir," he informed us. We entered the hotel under his watchful eyes.

Somehow we found a side door and ducked. We registered at another hotel and dinner helped a lot. We decided that we weren't to blame for this mess. We hadn't claimed that we *were* Army men—the bored O.D. had arbitrarily decided that for us. It was better not to have to explain our position, we felt, than to justify landing a civilian plane on an Army base without permission. At sunup we would go out to the port, get the plane and leave Sioux City in a hurry.

Our plan for a speedy departure meant avoiding Lieutenant Williams and further questioning. But the first person we saw when we stepped off the bus at the field next morning was Williams. My heart did a neat chandelle, stalled in my throat and stayed there.

"You fellows have a good time at the officer's club?"

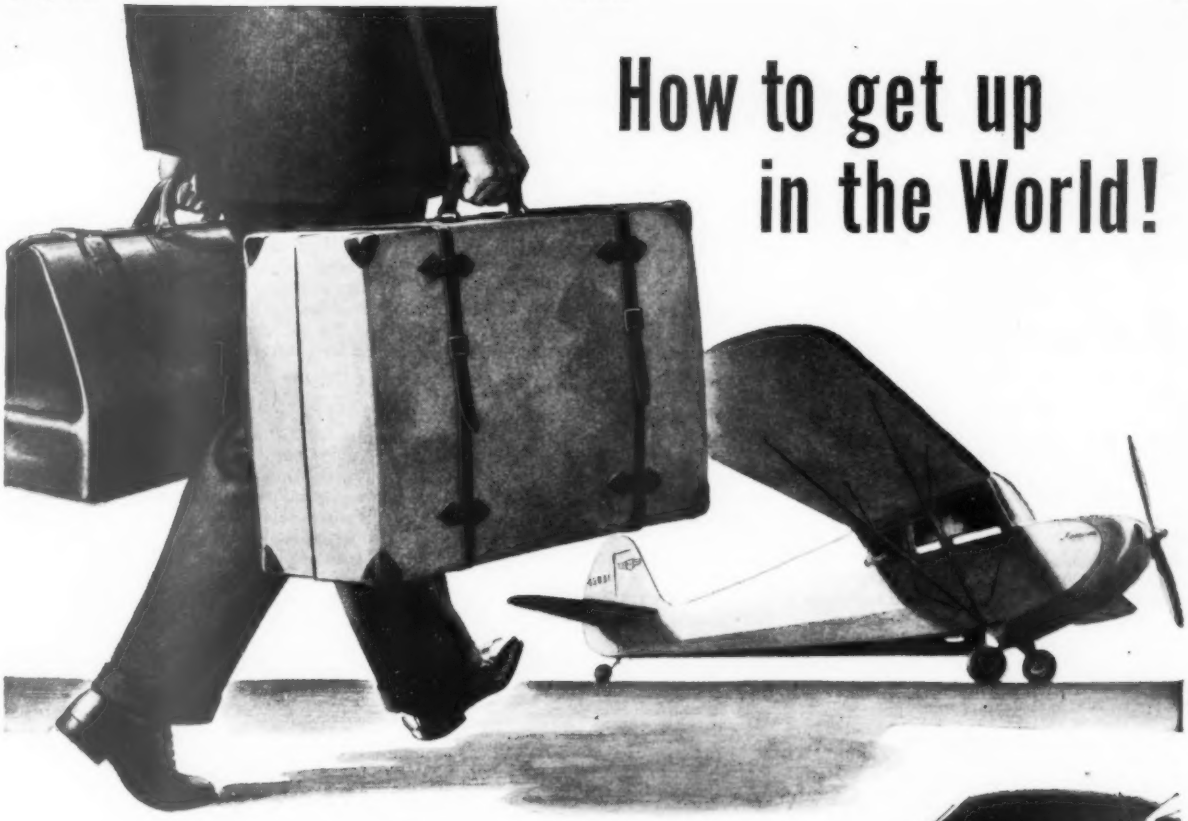
"Wonderful time, lieutenant," we lied.

"Wait a moment. I'll drive you out to your plane. Beats walking." His voice sounded like that of the warden promising a prisoner his last meal.

We reached the plane. I busied myself untying it without seeming to be in too much of a hurry. When the last ropes were removed I climbed in, primed the motor. Arnie cranked and the engine caught on the first twist. Williams stuck his head through my window.

(*Continued on page* 132)

How to get up in the World!



Personal flying used to be for a special kind of people. Now, with the help of Aeronca, it can be everyone's form of personal transportation. The salesman, the executive, the vacationist, the doctor—anyone who drives a car can fly his own plane for business or pleasure. And with this kind of . . .

Flying there'll be room and comfort growing out of 17-year-old Aeronca's experience and war work. The only light aircraft manufacturer to receive the Army and Navy "E", this company has models in the wind tunnel with new design, and new flying ease and new features.

Plans also foresee convenient airfields, including hangars and service stations for personal planes, just like those for automobiles. These are some of the things Aeronca anticipates for you—so that you and every air-minded person can "get up in the world" at a price you can afford. Send for the booklets!

AMERICA'S PERSONAL PLANE

AERONCA

has an important message for air-minded people

Department F-6
Aeronca Aircraft Corporation, Middletown, Ohio

Send me your valuable booklets:

(Check) _____"Aeronca—the Plane You'll Want to Fly"
_____"How to Make Small Airports Pay With Aeronca"

Enclosed is 10c for each booklet.

Name_____

Address_____

City and State_____

Export Agency—Aviquipo, Inc., 25 Beaver St., New York 4, N. Y.

Letters

HIS PLANE IS USEFUL

Sirs:

If an article ever cried for a reply, "Make My Plane Useful" is it. [See April FLYING.] As a former private flyer and aircraft draftsman, and now a military pilot, it never occurred to me that my own plane *wasn't* useful; it was built to operate in the air and served that purpose 100 per cent.

I believe the airplane is viewed by many from the wrong angle. It never was and never will be (I hope) a ground vehicle. The roadable plane will be only a novelty, since it is not essentially an automobile and cannot be so constructed. I do believe more eye appeal should be put into lightplanes and the price brought below $1,000. Many people never have been, nor ever will be interested in flying, so this idea of an airplane in every backyard is impractical visionary dreaming. This may stamp me as a non-progressive but let's keep the airplane in the element for which it was designed and develop its possibilities there.

LIEUT. CARROLL H. NEVERMANN
APO, New York, N. Y.

Sirs:

Enjoyed "Make My Plane Useful" in the April issue of FLYING and hope someday to have a plane of my own. I am a farmer and think a plane similar in performance to the McDonnell *Doodlebug* would fill the bill perfectly. What are the chances of some manufacturer making a plane on this order?

JONAS ASPLUND
Eatonville, Wash.

PROPOSED JET JOB

Sirs:

"How Fast Is Fast" by Gilbert Close in the April FLYING provided me with an idea which I outline here. Since aircraft with wings will not travel faster than the speed of sound, why not support the plane by having small auxiliary jets to provide the lifting power? These front jets could rotate in a vertical plane, with their angle slightly upward to meet the line of thrust of the main jet. When sufficient speed had been attained, the wings could be folded inward, overlapping, and the jet power applied.

Landing would require the wings to be unfolded, and the flap area extended to obtain additional lift. This might lend full control at high and low speeds. I realize there are many difficulties to be overcome but do not think they are insurmountable. The idea is in rough form, but I present it for what it might be worth.

LIEUT. PAUL A. LUND, Signal Corps
Baltimore, Md.

RE "GULPED LIGHTPLANE"

Sirs:

There is doubt here at the 145th Army Air Base as to the possibility of loading

an Aeronca in the DC-3 as shown on page 98 of FLYING's February issue. It is believed the picture is not the actual *loading* of a plane. How about it?

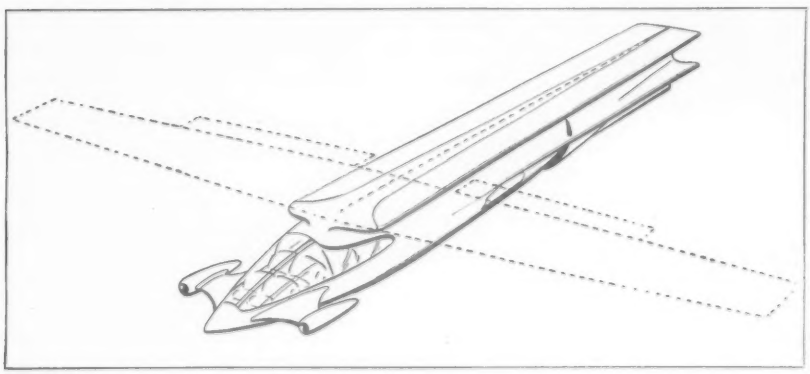
DENNY PETERSON
Great Falls, Mont.

Sirs:

The writer plus nine other passengers rode in the Douglas with the lightplane in question. However, FLYING was in error. The plane was a Taylorcraft, not an Aeronca. The CAA Douglas, called the DC-3½ BD (for Big Door) in Alaska, has an especially wide door for loading large radio transmitters and bulky loads. For loading the little plane, the wings, landing gear and horizontal tail surfaces were removed.

CHARLES E. PLANCK, CAA
Chief, Current Information
Washington, D. C.

● In the interest of authenticity, FLYING checked with Mr. Planck, one of the passengers on the DC-3 in question, to verify the feat shown. His letter (above) clarified one issue, but raised another. A wager as to the accuracy of FLYING's identification of the plane being loaded was hastily by-passed by Planck. Check of the NC number proved the lightplane to be an Aeronca—ED.



Jet plane suggested by Lieutenant Lund shows extended wings and flaps in dotted lines. They would fold over tail at high speeds with auxiliary jet nozzles in nose providing lift.

ARMY VS. REILLY

Sirs:

I have just finished reading "How the AAF Uses Air Power" by Brig. Gen. William W. Welsh. I have followed this highly interesting controversy [tactical vs. strategic use of air power] in your pages for a year or so and have almost been convinced by Brig. Gen. Henry J. Reilly [who advocates tactical employment of air power. See page 21 of this issue]. Although I don't think he is 100 per cent right, I do believe he should be listened to, as you say, "respectfully." His views, at least, are based on experience.

I am an ex-newspaper man and it occurred to me—as a shot-in-the-dark hunch—that perhaps Brigadier General Welsh's article was an attempt on your part, or the Army's, to answer General Reilly. Knowing how these things work, I'd think it was the Army except that they wouldn't have gotten the Assistant Chief of Air Staff for Training to write an "official policy article." If my guess is right, I critize the process of mind by which you came to the conclusion that he had the status to do the job even if he may have the ability.

A. W. HAMILTON
New York, N. Y.

FLIGHT PROBLEMS

Sirs:

Your aid is sought in solving a few problems involved in changes of wind velocity on a plane in flight.

1. If a plane in level flight at 60 m.p.h. indicated air speed flying against a prolonged gust of wind of 40 m.p.h. suddenly runs into calm air, will the plane stall and will it need to lose altitude to regain flying speed?

2. Wind at 100-feet altitude is 40 m.p.h. at 50-feet, 20 m.p.h. and at ground level, 10 m.p.h. Would a plane making an approach in a slow glide be apt to stall because of the change in wind velocity?

3. Flying against a 50-m.p.h. head wind approaching the lee side of a mountain, would a plane lose altitude when running into the still air?

I maintain in all three cases the plane would have to lose altitude to regain flying speed.

CARL MENDIUS, JR.
Riverside, Ill.

● 1. Assuming plane's stalling speed is below the 60 m.p.h. indicated air speed, it will not stall. Stalling results from loss of air speed. Wind affects only ground

(*Continued on page* 148)

Folks who'll fly tomorrow . . .

and why they will

1. "**Take it from a veteran** bean shipper. In *this* business you've got to get over the territory fast when the season starts. When I can fly over the Michigan bean country in my postwar Cessna, I'll make more contacts. And it's a better way to judge acreage. So I'm expecting bigger profits when I can fly my Cessna."

2. "**My Four Nieces and Nephews** live all over the map, from Maine to California. I've never seen them but, believe me, I'm going to, easily and often, when we get our new Cessna. Of course, my husband may make a fishing date at Lake of the Woods some week end when I need the Cessna. Maybe we ought to have two."

CHOOSE CESSNA!

PUTTING THE *FIN* IN *FINISH* FOR JAPAN

Moby Dick himself never had dorsal fins as huge as these for gigantic Boeing B-29 Superfortresses. And this picture is of vital interest to anyone who really wants to go places and see things after the war. Because these big fins are precision-built right here at Cessna . . . by the men who'll build *your* postwar plane.

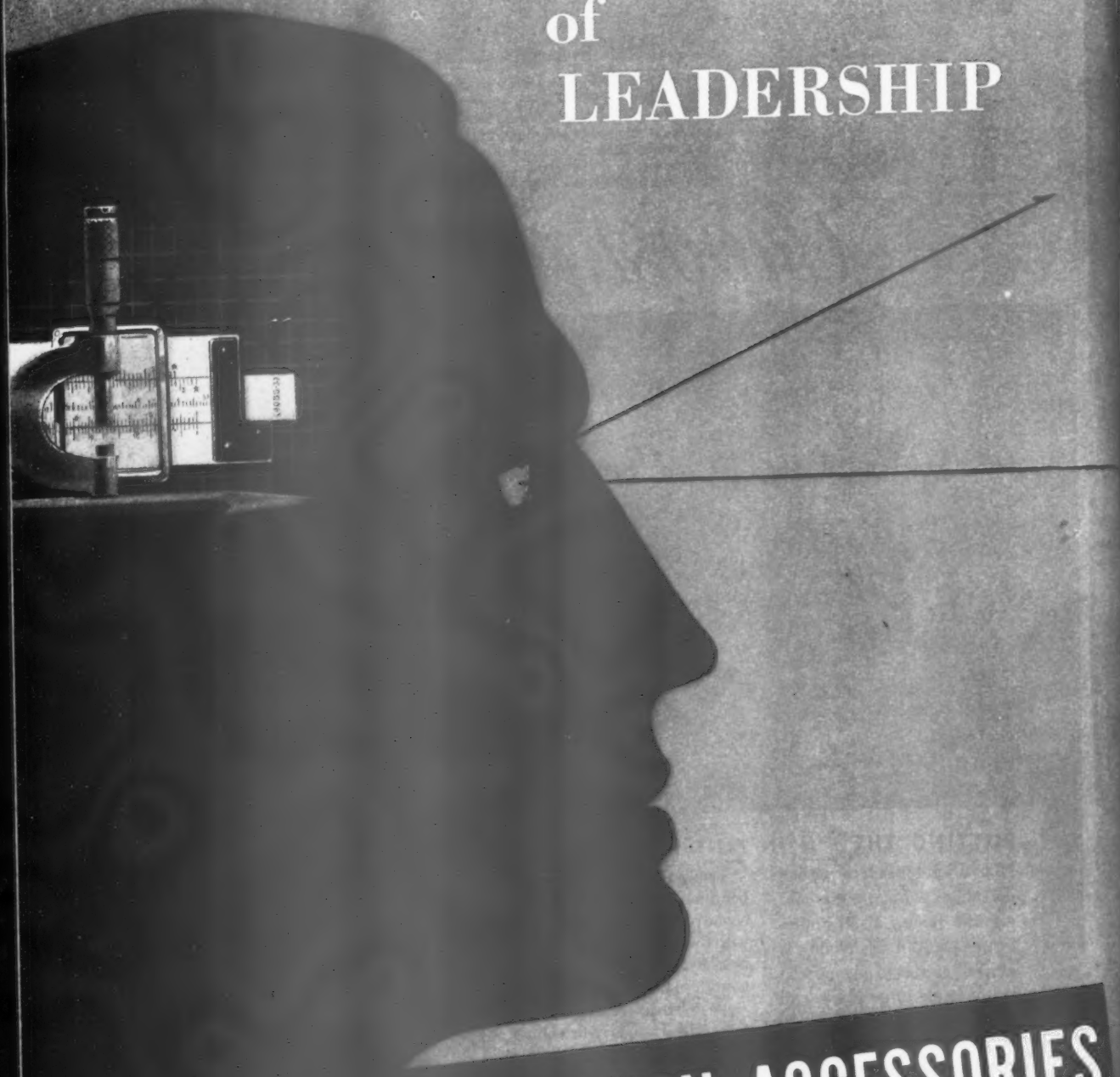
Tremendous strides have been made at Cessna in high-speed precision manufacturing with the new light metals. This is *now saving* and *will save* countless hours of labor when we switch to peacetime production. The Cessna you choose for your Family Car of the Air will be *more airplane for your money, "Safety-Engineered"* from nose to tail.

CESSNA AIRCRAFT COMPANY, Box 1616-F, Wichita, Kansas

Cessna

THREE TIMES JUDGED "THE WORLD'S MOST EFFICIENT AIRPLANE"

Background of LEADERSHIP



Eclipse AVIATION ACCESSORIES

Eclipse-Pioneer Division • Teterboro, N. J. • Los Angeles 36, Calif.

continuous practical research assures airborne accessories in step with advancements in plane design

From the early days of aviation, Eclipse engineers have led in unremitting research for better airborne aviation accessories.

Recognizing that there is no such thing as perfection, Eclipse engineers, men of vision mated with practical know-how, have constantly improved their products and are daily solving new and difficult aviation accessory problems.

Design-proven by continuous practical experience . . . Test-proven by modern methods and finest facilities . . . and finally Flight-proven under the most exacting conditions, Eclipse Aviation Accessories emerge as the finest in use today.

We have the men and the means—let us work with you on today's needs and tomorrow's problems.

EVERY ACCESSORY ANY PLANE NEEDS—ENGINEERED AND BUILT WITH ECLIPSE CRAFTSMANSHIP

KEEP AMERICA STRONG . . . BUY MORE WAR BONDS

Bendix

AVIATION CORPORATION

THE LIBRARY

JANE'S ALL THE WORLD'S AIRCRAFT, compiled and edited by Leonard Bridgman; published in the United States by The Macmillan Co., 60 Fifth Ave., New York, 1945. Approximately 600 pages. Price $19.

It is difficult to be critical of this monumental effort. For many years Jane's has been the bible of international aviation. Though it is a British publication, it surpasses anything in the same field that has been attempted in the United States. The Macmillan company—itself an offshoot of a British publishing house—recently started publishing Jane's in this country. They simply reproduce the British book exactly as it appears in England, from another set of plates made in the United States.

Leonard Bridgman has been recognized for many years as one of the few real aviation authorities in the world. Jane's is testimony to his knowledge of this much-abused subject. It also reflects his constant efforts toward accuracy. He has followed standards he set for himself so well that Jane's is considered the most accurate, authoritative directory of its kind in the world. The 1943-1944 volume is no exception. Perhaps the only fault we can find with Mr. Bridgman's own work is that he does use some fairly old photographs in the section dealing with American aircraft—despite the fact that the book went on sale in the first week in March. For example, neither the Republic *Thunderbolt* or North American *Mustang* are shown with the "bubble" cockpit hatch; old models of both aircraft are shown. This type of inaccuracy, although of not enough importance to rule out the volume as an authoritative directory, is rather common throughout the American section. Another type of inaccuracy—in the case of Jane's it is an inaccuracy rather than padding—is the inclusion of several aircraft that are either obsolete or extinct. Some American examples found in this latest edition: the Boeing *Sea Ranger* (XPBB-1), the Brewster *Bermuda* (SB2A), the Curtiss *Seagull* (SO3C), the Curtiss *Falcon* (SNC-1), the Spartan NP-1, the Timm *Tutor* (N2T-1).

From a production standpoint the American edition of Jane's is at its worst. The reproduction of photographs in this volume comprise some of the worst book printing we have seen in recent years. If every copy of the American edition is printed as poorly as is our reviewing copy, we recommend that prospective purchasers try to buy a copy of the original British edition through a book dealer. A copy of the American edition is far from being worth $19. MAX KARANT

THE AIRMAN'S ALMANAC, edited by Francis Walton; published by Farrar & Rinehart, 232 Madison Avenue, New York, in 1945. 512 pages. Price $1 for paperbound edition.

Aviation long has been in need of a compact annual reference book which would combine a sort of "American Jane's" with other information useful to airmen. The Airman's Almanac falls far short of meeting this need. It is, first, a misnomer to call it an "almanac," in the sense that the famous World Almanac is an "almanac." Its editors lacked a basic starting concept of what an almanac is or should be. Their treatment is neither succinct enough nor thorough enough—yet at the same time it is far too voluminous for the subject matter covered. It is more nearly a baby encyclopedia.

There is some excellent information in the Airman's Almanac but the reader will look in vain for detailed manufacturing data, sufficiently detailed information on either aircraft or engines, chronology of the year, or similar material which would seem logical for a book with this title. At the same time, the reviewer is hard-put to understand why the Airman's Almanac should contain such irrelevancies as a list of natural features of the world, crop production statistics, or a section on Basic English. CURTIS FULLER

FLYING

"According to my calculations, I don't know where we are."

SHORT VIEWS

AERODYNAMICS, by L. R. Parkinson; published by the Macmillan Co., 60 Fifth Ave., New York, in 1944. 112 pages. Price $2.25.

Slanted directly to members of design and testing departments who need to be conversant with the basic modern theories of aerodynamics, this work attempts to cover both elementary and advanced phases of the subject with a minimum of mathematics. It will be of little use to either the novice or the trained aerodynamic engineer.

FLIGHT HANDBOOK, edited by G. Geoffrey Smith; published by Flight Publishing Co., Dorset House, Stamford Street, London, in 1944. 209 pages. Price $1.60.

The fourth edition of a manual on basic aeronautical theory and practice prepared annually by the editors of *Flight* and *Aircraft Production*, British aviation magazines. Subjects treated include first principles of flight, advanced aerodynamics and power plants. Attempt at simplification has been made for the benefit of the average reader.

CATALOG OF SERVICE INSIGNIA; edited and published by the Roy Paris Co., 1514 Main Street, Dallas, Tex. 96 pages. Price 25 cents.

A sales listing which provides a fair index to U. S. Army and Navy insignia currently in use. END

SPARTAN AERO REPAIR

Now Entirely Available To Private Owners

COMPLETE ONE-STOP SERVICE
100% C. A. A. APPROVED

Airplane Shop—for repair and overhaul of everything on your plane—of wood, fabric or metal construction.

Engine Department—for complete repair and overhaul. Latest engine test stands.

Instrument Shop—for absolutely dependable repair and overhaul. Latest calibrating equipment. Temperature and moisture-controlled laboratories. $30,000.00 stock of spare parts.

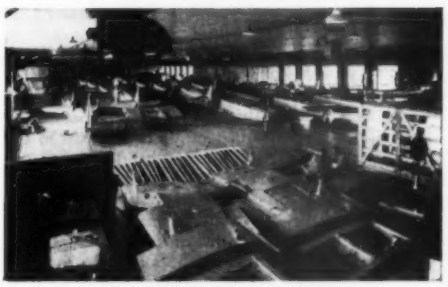
Propeller Shop—for complete adjustment and repair of all types of wood and metal propellers.

Radio Shop—the most modern radio manufacturing and overhaul department in this part of the country.

America's Most Convenient Station

. . . and one of America's most complete and highest rated stations! Spartan's equipment is the most extensive and facilities the most modern in the nation's finest "flying country." All technicians are highly skilled and supervised by experts with years of experience. Being one of the few repair stations with 100% government approval in all departments, you can depend on Spartan to produce best results on any repair or overhaul job. Set your course for Spartan for superior service with economy.

Scene in Repair Department



View of Airplane Overhaul Shop

FREE CATALOG — Write now for interesting picture and word story of this great one-stop station. It's free!

Private Owners and Fleet Operators are getting expert overhaul work at Spartan at reasonable prices.

Mail Coupon for Full Details

SPARTAN AERO REPAIR

DIVISION OF SPARTAN AIRCRAFT COMPANY
TULSA, OKLAHOMA **Established 1928**

SPARTAN AERO REPAIR, Dept. F. 65
SPARTAN AIRCRAFT COMPANY
CAPT. MAXWELL W. BALFOUR, Director
TULSA, OKLAHOMA

Please send catalog giving full details about your Aero Repair Division.

Name .....

Address ..... State .....

City .....

Aviation Connection .....

.....

XUM

AOPA NEWS

The Aircraft Owners and Pilots Association (AOPA), with National Headquarters Office located in the Carpenters Bldg., Washington 1, D. C., is a non-profit organization composed exclusively of pilots. It looks after the pilot's best interests in all phases of aviation and helps individual pilots with their individual problems. The AOPA operates with a full-time professional staff and is the largest group of civilian pilots in the world. This column is edited by the Aircraft Owners and Pilots Association and opinions contained in it are not necessarily those of FLYING. A special bulletin is sent each month to all registered AOPA pilots and also confidential newsletters from AOPA's Washington staff are sent members from time to time.

POOR SERVICE AT AIRPORTS

AOPA pilots who habitually do a great deal of cross-country flying are urged to use the AOPA Flight Report Form. It is designed to permit AOPA pilots to report to national headquarters the condition of airports and service rendered at airports so that AOPA may intelligently direct pilots to the best airport facilities.

After visiting an airport, AOPA pilots fill out the AOPA Flight Report Form answering several simple questions regarding the condition of the field, promptness of service, availability of transportation into town, cleanliness of rest room facilities, etc. The report form is mailed into national headquarters and filed under the airport's name. At frequent intervals AOPA's staff reads over the reports received on each airport and rates the field according to whether the reports are favorable, unfavorable, or average. Members writing to AOPA for routing information are then recommended to use, where feasible, the airports having the better ratings.

At the close of each rating period AOPA will advise the airport manager concerning what pilots have reported on his airport facilities. It is then up to the operator as to whether he desires to improve conditions and better his rating. Airports showing a marked improvement will have their ratings raised.

AOPA pilots who do not have a supply of report forms may obtain them by writing to the AOPA National Service Office, 1003 K St., N. W., Washington 1, D. C.

SIMPLIFIED AIR TRAFFIC RULES

Experienced aviation observers are astonished at the continued delay in passage of the new "streamlined" Part 60, Air Traffic Rules. The delay has been occasioned by petty bickering within the various departments of the CAA. The CAB must also be confused about the unusually far-sighted and practical opinion of the new Administrator of Civil Aeronautics, Theodore P. Wright, who has repeatedly announced to the public his personal desire to have regulations drastically curtailed and revised into simplified form. The confusion results in representations made by department heads of the CAA—particularly those of the safety regulation division—who apparently are working in the opposite direction. Each head seems determined to put back into the regulations many, if not all, of the obnoxious and unnecessary features which had been eliminated in the streamlined revision recently circulated to AOPA pilots.

AOPA has great faith in the word of the CAA Administrator and in the untiring efforts of members of the CAB. We sincerely hope that before this column is read by AOPA members and friends a *Washington Newletter* may be dispatched telling of the passage of the new streamlined Part 60, Air Traffic Rules.

KILLING THE GOLDEN GOOSE

We believe one of the most accurate gauges in the aviation industry is the AOPA mail bag which daily brings in hundreds of reports from non-scheduled pilots throughout the country. These letters cover many subjects, some related to personal dilemmas of aircraft owners and pilots and others to general aviation problems.

Some complaints contained in these reports concern fixed-base operators and their business practices. (Many AOPA members are also fixed-base operators. In a recent survey conducted by AOPA among 5,000 members chosen at random, it was discovered that 74 per cent of the membership are current aircraft owners.) The complaints regarding fixed-base operator practices were in the main registered by aircraft owners and included the following:

(1) Exhorbitant hangar rentals; (2) equally high stack-down charges; (3) preferential hangar rates to owners who use local mechanical servicing facilities; (4) haphazard aircraft handling in hangars resulting in frequent minor damage; (5) sloppy hangar maintenance subjecting aircraft to unnecessary fire risks; (6) excessive charges for overhaul work. [See "How Not to Run an Airport," in this issue of FLYING, page 35.]

A few of these charges can be amplified. There is a known shortage of hangar space and airport facilities. Hangar rentals have risen, according to AOPA statistics, to an all-time high. In many places, fixed-base operations approximate plain racketeering. There are many examples of airports formerly charging $5 per month who are now charging as high as $50. There are a number of airports charging $25 per month for the privilege of stacking an airplane without even offering guard or storm protection facilities in return. This is profiteering without any possible justification.

AOPA believes this is a problem which should be faced squarely by fixed-base operators individually or through their association, the National Aviation Trades Association. After studying the volume and nature of these letters, we are convinced that fixed-base operators by participating in these practices or by allowing their associates to pursue them, are causing damage to aviation which may never be fully repaired.

AOPA consistently has sought better business practices in airport management and fixed-base operations and in all fairness we repeat that if the present crop of aviation operators cannot control this situation they are merely inviting competition from hardheaded businessmen who will give this service minus the unfair profiteering.

The present situation presents a real and deep challenge to fixed-base operators to put their house in order without further delay and to learn and practice the meaning and value of *customer service.*

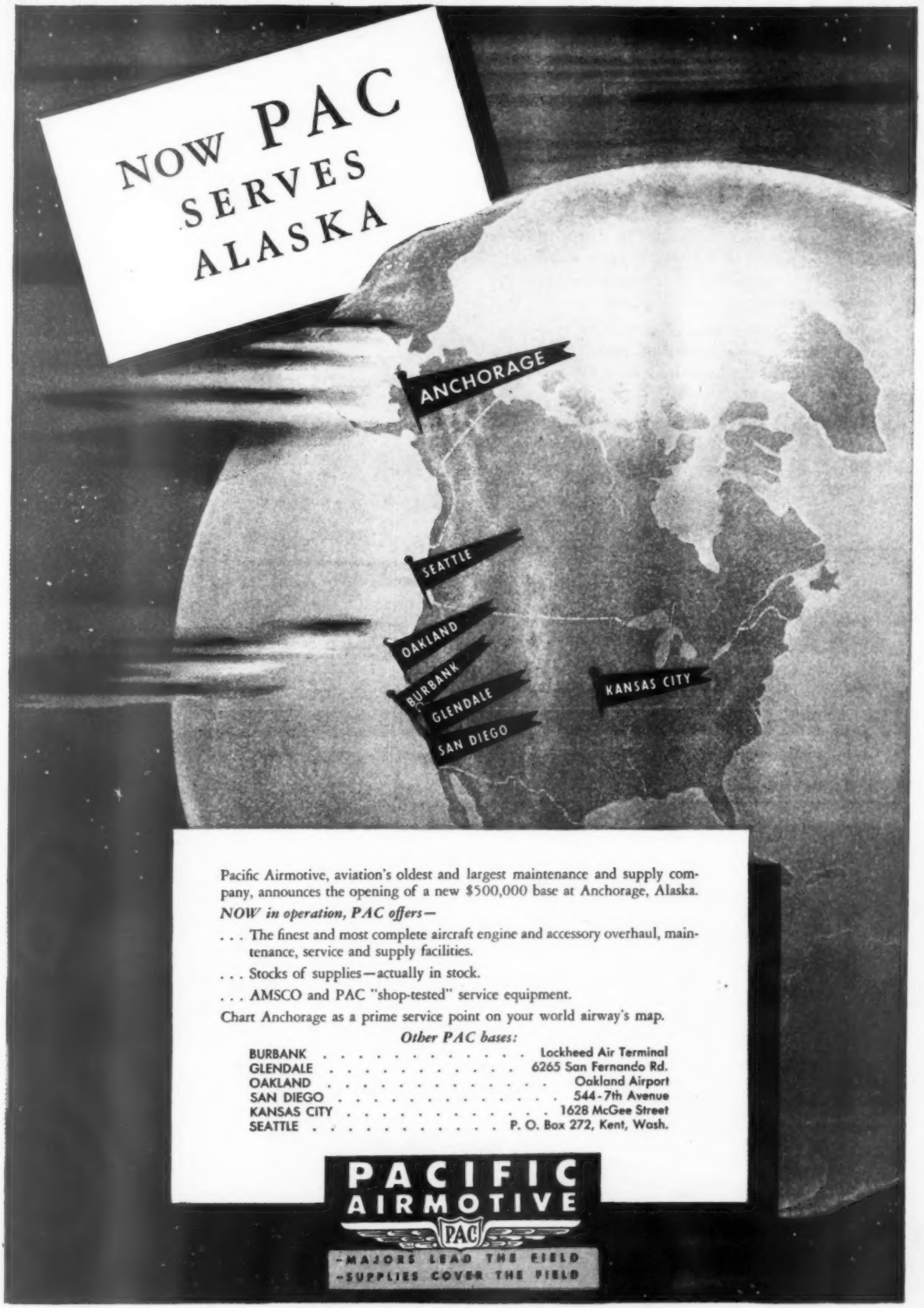
MEDICAL EXAM STATUS

It is often difficult to interpret decisions made in Washington. In particular, this may be said of verdicts rendered by the Civil Aeronautics Administration. So it is with some fear and trembling that we speak of the present status of medical examinations for private pilots and of our efforts to bring about changes in them. Since this story is being written four weeks in advance of its publication date, we are obviously counting a few aviation chicks before they hatch.

For instance, the current prediction is that private pilots after June 1 will no longer be required to have their physicals given by a CAA-approved physician. They will simply obtain a form from the CAA which may be taken to one's own family physician who will conduct the examination by reporting on a few pertinent medical questions.

Assuming this to be correct and that the CAA will not reverse itself, we have reason to rejoice. But the battle is not yet won. The next crisis will involve the determination of medical standards. This matter is to be reviewed by the Civil Aeronautics Board in the very near future. The CAB will decide what the medical examination shall consist of and what the acceptable standards must be. Obviously, the progress made so far will have been for naught if the old CAA medical examiner clique succeeds in "packing" the new private physician examination form.

Continued pressure for simplification of medical standards will be brought to bear by AOPA. Interested members should give careful attention to the deliberations of the CAB. Members of the Board consist of L. Welch Pogue (chairman), Edward Warner (vice chairman), Harllee Branch, Oswald Ryan and Josh Lee. Members of the Board have their headquarters in the Commerce Building, Washington 25, D. C. END



Pacific Airmotive, aviation's oldest and largest maintenance and supply company, announces the opening of a new $500,000 base at Anchorage, Alaska.

NOW in operation, PAC offers—

. . . The finest and most complete aircraft engine and accessory overhaul, maintenance, service and supply facilities.

. . . Stocks of supplies—actually in stock.

. . . AMSCO and PAC "shop-tested" service equipment.

Chart Anchorage as a prime service point on your world airway's map.

Other PAC bases:

BURBANK	Lockheed Air Terminal
GLENDALE	6265 San Fernando Rd.
OAKLAND	Oakland Airport
SAN DIEGO	544-7th Avenue
KANSAS CITY	1628 McGee Street
SEATTLE	P. O. Box 272, Kent, Wash.

PACIFIC AIRMOTIVE

PAC

-MAJORS LEAD THE FIELD
-SUPPLIES COVER THE FIELD

GETTING READY FOR TOMORROW?

. . . so are we!

PREPARING BRAND NEW COURSES FOR RETURNING SERVICEMEN AS WELL AS FOR CIVILIAN STUDENTS

● Aviation is changing so fast today that even war pilots with thousands of hours, and veteran aviation mechanics will need advanced training to keep up with its advancements and developments.

The modernly trained man of tomorrow will actually have a greater opportunity in aviation than the veterans who have not kept in step with aviation's rapid strides.

So, while we are now 100 per cent engaged in war work, we have discarded our old courses, and have answered all inquiries with "Sorry, no more enrollments till after the war."

TEAR OFF AND MAIL

California Flyers, Inc., Dept. F-6
Los Angeles Airport, Los Angeles 43, California.

Gentlemen: Please send me your *free* catalog.

Name..... Age.....

Address.....

City..... Zone..... State.....

For, as you know, *California Flyers* courses have always been not only *practical*, but *modern in every respect.*

Thus, when victory is an accomplished fact, you will find a *brand new California Flyers school of aeronautics*, brand new equipment and brand new courses — complete new courses for civilians and returning servicemen — supplementary courses for returning war pilots and aviation mechanics. We cannot release the details of what we have planned, but in all sincerity we say: *They Are Well Worth Waiting For!*

FREE BOOK OUTLINES AVIATION CAREERS

We've still a few of our 64-page illustrated catalogs. They're obsolete in some respects, but contain much information you'll enjoy about piloting, engineering, mechanics, etc. No obligation, no charge. The book is *free.* Send for it today.

CALIFORNIA FLYERS, INC.

SCHOOL OF AERONAUTICS

LOS ANGELES AIRPORT • LOS ANGELES 43, CALIFORNIA

THE TEST PILOT'S PASSENGER

BY PHILLIP ANDREWS

Editor and Publisher of "Air News" and "Air Tech" tells how delicate flight research instruments run aircraft "behavior tests" while the pilot flies.

Test pilot Chalmers H. Goodlin and Engineer Stuart K. Edleson talk over a motion picture record of a test flight.

"ONE of the keenest scientific combinations of mechanical brains and eyes is the flight instrumentation equipment designed and built by Bell Aircraft's Flight Research Division. It is the kind of equipment which will assure safer flying for you in the peacetime aviation days to come.

"The test pilot of a high-performance fighter, like the Kingcobra, has no room for extra passengers, nor has he time to record scores of instrument readings himself. But the readings *must* be made—from all parts of the plane—and they must be complete and right.

"So Bell engineers developed their own equipment, smaller than available commercial instruments and capable of installation in half the time.

"From take-off to landing, while the pilot concentrates on putting the plane through her paces—loops, climbs, high-speed runs, breath-taking power dives—these delicate instruments are always at work, recording complicated data on stress, strain, pressure, temperature and all the other things the engineers want to know.

"While all this happens, a movie camera is automatically making a continuous film record, like the one shown in the picture, of all the cockpit panel instruments.

"And when the flying is done, the record is still there, accurate and complete, available for the kind of thorough analysis and study that makes for faster production in the factory and dependable planes in combat.

"Bell Aircraft's emphasis on scientific research and creative engineering has played an important part in the tremendous forward strides of the aircraft industry since the start of the war. And when the day of victory comes, count on this progressive company to pioneer on peacetime aviation horizons."

★ *Buy War Bonds and Speed Victory* ★

MEMBER AIRCRAFT WAR PRODUCTION COUNCIL...EAST COAST, INC.

BELL *Aircraft*

PACEMAKER OF AVIATION PROGRESS

NIAGARA FRONTIER DIVISION
Buffalo and Niagara Falls, N. Y.
Airacobra (P-39) and Kingcobra (P-63)—Fighters
Airacomet—America's First Jet Propelled Plane
The Bell Helicopter

ORDNANCE DIVISION
Burlington, Vt.
Flexible Gun Mounts and other ordnance materials

GEORGIA DIVISION
Marietta, Ga.
B-29 Boeing Designed Superfortress

© Bell Aircraft Corporation

FOUR FREEDOMS IN FLIGHT...

THE SPERRY ATTITUDE GYRO OFFERS FREEDOM FROM

CAGING · TUMBLING · MISINTERPRETATION · FATIGUE

Now, for the first time, the pilot knows the attitude of his plane continuously, at any flight angle, regardless of visibility or extreme turbulence.

An electrically driven gyro stabilizes a sphere which is universally mounted—without limit stops—allowing full 360 degrees freedom of indication about the roll and pitch axes of the airplane. (The airplane actually maneuvers around the indicating sphere.) No caging is needed!

Pattern indication by daylight or by artificial light gives the pilot a quick, visual picture of his attitude at all times—a single glance tells the story. Thus the pilot can control his aircraft under instrument conditions for long periods without fatigue.

The Sperry Attitude Gyro makes instrument flying safer, easier, and more versatile. Write our Aeronautical Department for further information.

SPERRY GYROSCOPE COMPANY, INC. GREAT NECK, N. Y.

★

Division of the Sperry Corporation

LOS ANGELES • SAN FRANCISCO • SEATTLE • NEW ORLEANS
CLEVELAND • BROOKLYN • HONOLULU

GYROSCOPICS • ELECTRONICS • RADAR • AUTOMATIC COMPUTATION • SERVO-MECHANISMS

Army Air Forces Report

(*Continued from page 45*)

rious boxes and went into business.

For the invasion of small islands in the Central and Southwest Pacific, one- and 10-day repair pack-ups were designed and prepacked for various types of airplanes.

Steel pierced-plank has continued to perform outstandingly in all theaters of operation. Production of this type of runway surfacing totals 662,000,000 square feet to date, a quantity sufficient to surface a four-lane motor highway from New York to San Francisco. During 1944, 589,000,000 square feet have been shipped overseas. This quantity would be sufficient to surface 785 runways 150 by 5,000 feet in size.

In anticipation of airborne operations, aluminum pierced-plank has been developed under the direction of the Air Engineer during the past year, the first overseas shipment being in September. Requirements from the theaters for aluminum mat, for this year and next, already total 18,000,000 square feet, enough to surface 10 *Superfortress* runways.

The Air Transport Command

Our Air Transport Command has pioneered in intercontinental transportation, and the aid of the commercial airlines in this work, particularly in its earlier phases, has been acknowledged with appreciation many times.

It can now be stated that the Air Transport Command has delivered a total of 40,000 planes overseas up to January 1, 1945. In 1942 it was flying 4,800,000 miles a month in ferrying operations, by 1943 the rate was 12,500,000 a month, and in 1944 through November it was 21,872,000 miles a month. ATC flew 28,000,000 miles a month in transport operations in 1944, or 340,000,000 miles for the year. Totaling ferrying and transport operations, the ATC flies about 51,000,000 miles a month, or approximately 70 times around the world at the equator each 24 hours.

In 1944 some 560,000 tons of high priority passengers, cargo, and mail were carried by ATC and most of the 1,200,000 passengers flew over foreign routes. Some 80,000,000 pounds of mail, or more than 3,500,000,000 letters were included in this total. The ATC network of routes now totals 161,000 miles of which 118,900 is beyond the continental United States. A plane is crossing the Atlantic every 13 minutes, carrying whole blood for the wounded, along with vital personnel and cargo, and bringing back casualties. In 1944 the ATC carried an estimated 130,000 patients from the Ground, Service, Air Forces, Navy, and Allies.

Thousands of pounds of military cargo are flown by ATC over the Hump from India to China each month. During one 24-hour period some 2,500,000 pounds of freight were flown, or one flight every 2½ minutes. From foreign countries the planes have brought back vital war materials for domestic production, such as tungsten for armor, shells and filaments; mercury for detonators; tin; industrial diamonds; mica, and many other cargoes.

The above are regular cargoes. Here are some emergency ones:

In January, 1944, the Navy required additional engine parts on short notice for landing craft in the Pacific. Within 24 hours the ATC flew five tons of the parts to Hawaii. In May, 1944, the ATC diverted 11 planes to carry an emergency cargo of 55,000 pounds of mine-cutting equipment to the United Kingdom for use on D-Day. In June, 1944, the WPB said there was only enough of a certain crtical material on hand to keep the radio-radar production going for two weeks. The ATC diverted three *Commandos* from the Central African Division to lift 23,000 pounds of the material in India, and the first lots reached Miami four days later. As fast as they could be manufactured at Edgewood Arsenal, Air Transport Command rushed mortar propellant charges to Paris to help check the German breakthrough in December-January. Seventy thousand pounds of this vital cargo was delivered in the European theater two days after it left the factory.

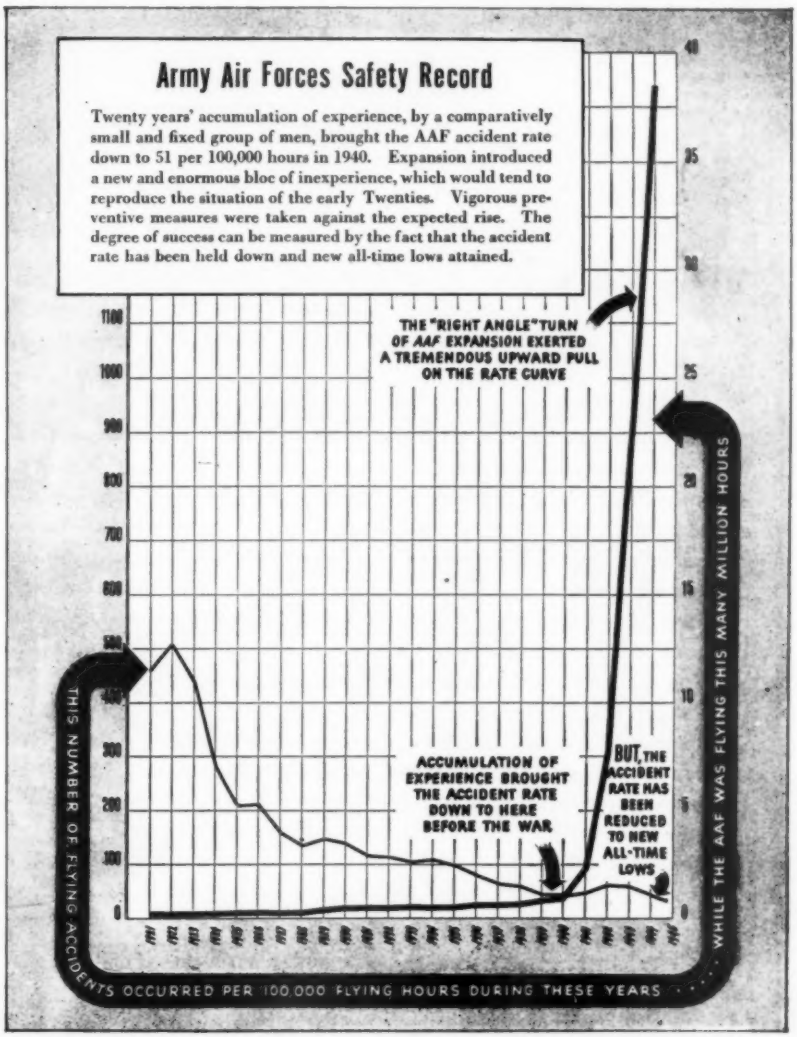
Aviation Medicine

The contribution of medical service to tactical success is not only proper care for the sick and wounded but also includes measures to protect and improve the efficiency of combat airmen and to prevent casualties.

During World War II, both the Allied and Axis air forces have experimented with various methods which would combat black-out. Since the pursuit plane is able to withstand more G than the human body, the pilot with superior G tolerance should be able to outmaneuver the enemy. The earliest workable G suits were introduced by the Canadian and Australian air forces, followed closely by the U. S. Navy. The AAF modified and adapted the 18-pound Navy suit after extensive tests on the human centrifuge at the Aero Medical Laboratory, Wright Field, O., and evolved the G-3 suit.

Several thousand G-suits were shipped overseas to fighter groups in 1944 and, unlike many items of personal protective equipment, they achieved immediate popularity among the men who have to wear them. Pilots have contributed case his-

(*Continued on page 94*)


Army Air Forces Safety Record
Twenty years' accumulation of experience, by a comparatively small and fixed group of men, brought the AAF accident rate down to 51 per 100,000 hours in 1940. Expansion introduced a new and enormous bloc of inexperience, which would tend to reproduce the situation of the early Twenties. Vigorous preventive measures were taken against the expected rise. The degree of success can be measured by the fact that the accident rate has been held down and new all-time lows attained.
THE "RIGHT ANGLE" TURN OF AAF EXPANSION EXERTED A TREMENDOUS UPWARD PULL ON THE RATE CURVE
ACCUMULATION OF EXPERIENCE BROUGHT THE ACCIDENT RATE DOWN TO HERE BEFORE THE WAR
BUT, THE ACCIDENT RATE HAS BEEN REDUCED TO NEW ALL-TIME LOWS
THIS NUMBER OF FLYING ACCIDENTS OCCURRED PER 100,000 FLYING HOURS DURING THESE YEARS
WHILE THE AAF WAS FLYING THIS MANY MILLION HOURS

THERE'S A *New* FEATHER IN WACO'S CAP

Now rolling from the production line and winging its way off to war is the newest addition to the ranks of the "whisper" ships.

It's the CG-15A . . . a bright new feather in the cap of its designer and builder—WACO.

Similar in many respects to the WACO-designed CG-4A, this newest AAF glider incorporates several new features which are the outgrowth of the battle experience gained by the CG-4A in spearheading four major invasions. Wingspread has been shortened 20 feet to increase towing speed . . . a new nose section provides better vision and greater strength . . . passenger and cargo capacity has been increased . . . landing gear improved.

In the three military gliders previously designed by WACO for the AAF . . . and here again in the CG-15A, is evidence of the important contribution which WACO's long experience in plane design and construction is making toward Victory.

After Victory, when this same experience is again applied to peace-time plane production, the result will be something you'll want to see . . . something you'll want to own and fly. THE WACO AIRCRAFT COMPANY, 46 Peters Avenue, Troy, Ohio, U. S. A.

The CG-4A has a wingspread of 83' 8"; carries a two-man crew and 13 men; and has a useful load capacity of 3,427 pounds. The CG-15A (foreground, above) has a wingspread of only 62' 2½", but it carries 14 men, in addition to pilot and co-pilot, and can accommodate a useful load of 4,000 pounds.

Waco

WACO AIRPLANES

ALL ARMY CARGO-TRANSPORT GLIDERS ARE WACO DESIGNED

WHAT DO YOU MEAN—
WHAT'S IN
A
NAME
FLIGHTEX
• Airlines, manufacturers, pilots, maintenance men — they know there's a difference in airplane fabric. They know that the name FLIGHTEX means *lighter, stronger, smoother* fabric that surpasses U.S. Army & Navy specifications.

World's Premier Airplane Fabric FLIGHTEX FABRIC

FLIGHTEX

FLIGHTEX FABRICS, INC. • 93 Worth Street, New York 13, N. Y.

Leading Manufacturers of Fabric and Tapes for the Aircraft Industry

Export Representative—Aviquipo, Inc. 25 Beaver St., N. Y. Cable Address—"Aviquipo"

RESALE DISTRIBUTORS

AERONAUTICAL TRADING CO., Jamaica, N. Y.
AIR TRANSPORT EQUIPMENT, INC., Garden City, N. Y.
AVIATION SUPPLY CORP., Hapeville, Ga., Orlando, Fla., Charlotte, N. C., Nashville, Tenn.
BOB TRADER-AERO SUPPLY, Pittsburgh, Pa.
GENERAL AIRCRAFT SUPPLY CORP., Detroit, Mich.
INTER CITY AVIATION, INC., East Boston, Mass.
KARL ORT, York, Pa.
LEAVENS BROS. AIR SERVICE, LTD., Toronto, Canada.
W. B. MATTHEWS CO., Aircraft Div., San Antonio, Tex.
PACIFIC AIRMOTIVE, Burbank, Cal., Oakland, Cal.
SNYDER AIRCRAFT CORP., Chicago, Ill., Columbus, Ohio, Denver, Colo.
SUPPLY DIVISION, INC., Robertson, Mo., Memphis, Tenn.
THE AIRCRAFT STEEL & SUPPLY CO., Wichita & Kansas City, Kansas.
VAN DUSEN AIRCRAFT SUPPLIES, Minneapolis, Minn., Waterloo, Iowa, Cleveland, Ohio.

(*Continued from page 91*)

tories of kills attributed to the extra margin of clearheadedness the G suit gave them during pull-outs and turns. Equally important, the device reduces the fatigue frequently resulting from aerobatics.

The Flak Suit

More than 600,000 flak suits and helmets have been procured for the Army Air Forces by the Army Ordnance Department since this type of body armor for bomber crews was originated in the 8th Air Force by Brig. Gen. Malcolm C. Grow. A flak suit, made of overlapping steel shingles in a quilt-like cover, was designed to protect the vital areas of the body after it was observed that low-velocity shell fragments from antiaircraft and aircraft cannon were responsible for 79 per cent of all wounds occurring among heavy bomber crews.

The AAF is now battle testing a new combat helmet, also developed by General Grow, with excellent results thus far. Unlike the conventional one-piece model, this helmet is a flexible, five-piece, close-fitting helmet. The older type weighed three pounds, the new one weighs two pounds, but experiments are being made with thicker steel.

Flyer's fatigue is an ailment peculiar to air combat. To cure it, AAF convalescent hospitals have developed a specialized treatment, the results of which are returning our men weeks and months ahead of schedule to assume positions in the AAF or in civilian life.

To his regular corrective exercises, a patient adds as much additional exercise as he wishes. He is encouraged to play golf, ride, fish, swim, and hike. Hospital authorities are continually looking for new therapy outlets. Farms are operated in conjunction with many of the convalescent hospitals . . . the patients managing them and doing the work. Recently, an AAF cow and AAF pig won blue ribbons at a county fair.

AAF Box Score

(December 7, 1941, through December 31, 1944)

Our Losses	
Lost in aerial combat vs. Germany	6,989
Lost in aerial combat vs. Japan	1,296
Lost by antiaircraft vs. Germany	5,002
Lost by antiaircraft vs. Japan	440
Destroyed on ground vs. Germany	92
Destroyed on ground vs. Japan	354
Lost by other causes vs. Germany	2,663
Lost by other causes vs. Japan	994
Total	17,830
Enemy Losses	
Destroyed in aerial combat	24,393
Probably destroyed in combat	6,294
Damaged in aerial combat	8,569
Destroyed on ground	7,153
Probably destroyed on ground	730
Damaged on ground	3,519
Total	50,658

Conclusion

This report is written at the end of the third year of a long and bitter struggle. We enter the fourth year with full realization that the end is not in sight and that unnumbered months of effort throughout the world and of grim fighting on all fronts are necessary to final victory.

Certain basic principles underlying our air power needs and on which our air superiority rests must be known and understood by every American. It is on these principles that the AAF's planning and operations have been conducted in this war and its responsibilities will be sustained until the day of Axis collapse.

1. Air power is the weapon with which the aggressor in this war first struck and with which future aggressors will strike.

2. We must recognize that the only certain protection against such aggression is the ability to meet and overcome it before the aggressor can strike the first blow.

3. The foregoing principles can mean only one thing to the United States. In two world wars, the aggressor has moved first against other peace-loving nations, hoping that the United States would remain aloof or that other nations could be defeated before this country's power on land, sea, and air could be brought to bear against him. Luckily, in each war there has been time for the mobilization of such power and the United States has been the determining factor in the defense of civilization. The lesson is too plain for the next aggressor to miss: *The United States will be his first target.* The United States must be the world's first power in military aviation.

4. Air power and air supremacy are terms which require careful definition. Their full significance must be understood by the American people. In 1918 air power was built around the Spad, the Handley Page, the Gotha, and the Caproni. In 1944 Allied air power was built around the *Spitfire*, the *Mustang*, the *Thunderbolt*, the *Hurricane*, the *Lightning*, the *Skytrain*, the *Fortress*, the *Lancaster*, the *Liberator*, the *Superfortress*, and others. In 1945 or 1946 it may mean other as yet undisclosed types. In 1952 it may mean far different equipment with destructive power and accuracy of which man has not yet dreamed.

5. Thus, the first essential of the air power necessary for our national security is preeminence in research. The imagination and inventive genius of our people—in industry, in the universities, in the armed services and throughout the nation—must have free play, incentive, and every encouragement.

6. It must also be fully understood that scientific research and development will not of themselves keep the United States in the lead. Scientific and tactical advances must go forward hand in hand and be reflected in the aircraft, armament, equipment and weapons actually being used by our air forces.

7. Even an up-to-date air force in being may not constitute air power. Preeminence in the air implies maximum ability to maintain and expand existing establishments. There must be a strong and healthy aviation industry, building thoroughly modern aircraft and equipment, and developing, testing, and experimenting with advanced designs for tomorrow.

The importance of a progressive aviation industry cannot be overstated. One

BONG AND BRIDE

MAJ. Richard Bong, top-ranking American fighter ace with a total of 40 verified kills, shows his bride, Marjorie, what flying a P-38 is like, with a piggy-back ride at Lockheed Air Terminal, Burbank, Calif. She is the "Marge" after whom Major Bong's famous *Lightning* was named.

Have You Got Fledgling Fidgets?

Lots of people have, these days. And, as Uncle Sam turns back more and more of the smaller aircraft that have served the war effort, the restlessness to get back into the air is going to grow.

Just a reminder, then, to check over the powerplant of the plane you buy, whether it is used or whether you wait for a new one.

DOES THE ENGINE HAVE:

- **Maximum dependability**
- **Maximum durability**
- **Maximum economy**
- **Ease of maintenance**
- **Guaranteed availability of parts**

Kinner engines have all these features

KINNER MOTORS, INC., Glendale 4, Calif.

Kinner

1919 - 1945 ★ BUILDER OF DEPENDABLE AIRCRAFT ENGINES FOR OVER A QUARTER CENTURY

BUY AND HOLD WAR BONDS

way to keep it progressive after final victory is promptly to sell, salvage, or scrap excess or obsolete planes so that they will not hang over the Air Force and the aviation industry, retarding development.

8. Air power must be employed from large, fully equipped, strategically located bases. Our air forces must be able to meet and overpower the aggressor's air threat as near as possible to its source. It is obvious that air operations are already global. Our air forces have learned in the stress of war to operate in all climates and under all conditions.

9. In all-out war the Army tactical air force and the Navy air force must work closely together with our Army and our Navy. Each must understand the techniques, tactics, capabilities, and limitations of the other. This can only be obtained by actual service together in tactical exercises and maneuvers during times of peace.

10. We have learned and must not forget that from now on air transport is an essential of air power, in fact, of all national power.

Another lesson taught in this war is that a healthy, self-sustaining commercial air transport industry is vital to the realization of effective air power. The contribution to the military of our competitive, civil carriers in equipment, trained personnel, operating methods, and knowledge have been of first importance in this war. The AAF and the nation as a whole have a very real interest in the pre-eminence of our civil transport structure.

11. Troop carrier operations are present-day actualities, as we have seen in Crete, New Guinea, Italy, Normandy, Southern France, Holland, and Burma. The American people must visualize that the aggressor's blow may be attended by dropping large bodies of troops to seize our vital centers. Similarly, to assure our security, we must be prepared to counter this employment of the airplane and to employ it more effectively ourselves.

12. None of these essentials of air power will be effective without adequate trained and experienced personnel. In this war, with a very small nucleus, we were forced to start from the bottom with raw material. The AAF Training Command has done a tremendous job in turning out large numbers of navigators, bombardiers, pilots, aerial gunners, glider pilots, liaison pilots, WASP's, and others. It has trained thousands of technicians and specialists essential to air power. All this took time but we cannot always count on having time.

The AAF and the nation must encourage private flying. We must make available to educational institutions aircraft and equipment that can be spared to help familiarize American young men and women with the fundamentals of aviation, for it is obviously upon youth that the nation must rely for its protection against attacks of aggressors.

The AAF can take pride in what has been accomplished in the past three years—but these accomplishments have cost the lives of many brave men. Air Force men have been in violent combat every minute since Pearl Harbor. Individually, they have crossed enemy lines to carry the fight to the Axis 6,500,000 times through December 31, 1944. Our men overseas have done their utmost and we shall not forget. It is with sober determination that we of the AAF undertake to increase our contribution to the total war effort of the United Nations. END

That Weick Patent

(*Continued from page 47*)

The Ercoupe is exceedingly simple for a beginner to handle, though usually confusing to an experienced pilot of conventional planes. It is capable of the same aerobatic maneuvers as a conventional plane except the spin, snap roll and sideslip, and it is unusually easy to taxi because its tricycle gear steers like an automobile. Although it was originally offered for sale with separate aileron and rudder controls if desired, so few were sold that the optional feature will probably not be offered after the war.

But the Ercoupe is not and never will be as foolproof as an automobile. Nor does it meet all the requirements set forth by experts and prospective purchasers in public opinion polls.

First, it's too expensive. The pre-war price of $2,665 will probably not be reduced much in the immediate post-war period, although the first year's output will be 3,000—some 26 times the total pre-war output. Except for its safety features, the Ercoupe is in about the same general performance class of its more conventional rivals—though cruising faster than most.

What, then, of CAA Administrator T. P. Wright's $2,500 family plane that will be quiet, fast, safe, roomy and convenient? What of the mass sales that are supposed to put 400,000 planes in the hands of private owners? Weick simply doubts there will be that many. As long as his plane holds its competitive advantage he sees no urgent need for radical improvements. Maybe three or four years after the war there will be a four- or five-place version, but it will be basically the same plane, only bigger.

Weick conceived the idea of a plane that would be hard to stall, impossible to spin and simple to operate when he was an engineer with the National Advisory Committee for Aeronautics.

He also set up other requirements, including economy of operation, good visibility for the pilot, ability to take off and land crosswind, a slow landing speed, and 100-m.p.h. cruising speed. With several associates he constructed the Ercoupe's second cousin, a queer-looking high-wing pusher, called the W-1. This plane, and its later refinement, the W-1A, never got into production but they provided valuable information that eventually led to creation of the Ercoupe.

FLAT TIRE

WHEN one tire on a dual landing gear blows at 80 m.p.h.—this is what it looks like. Actually, nothing untoward happened in this test, designed to evaluate the safety of the dual nose landing gear of the Lockheed *Constellation*. The inflated tire sustained the plane's load and the airplane handled normally.

The use of linked rudder and aileron controls and of tricycle landing gear is covered by a Weick patent granted in 1939. The single castering and steerable nosewheel—located in front of the center of gravity of the airplane—is now accepted as commonplace. But the device hadn't been used generally until Weick demonstrated its advantages on the W-1. One of the deterrents to flying, he believes, has been the high degree of skill required to land conventional planes—the flat angle of glide required, the relatively long runways and high speed, and to the inherent tendency to groundloop or nose over in landing under adverse conditions.

Ercoupe landing gear, with the two main wheels located behind the center of gravity and the single castering wheel in front, is directionally stable; that is, the plane tends to continue in the direction of flight after contact with the ground, rather than in the direction in which it is pointed. Such gear makes it very difficult to nose over in spite of rapid braking and checks any tendency of the plane to groundloop. Because of its stability and long shock struts, the gear absorbs great vertical landing velocities. This gives the pilot a wider selection of gliding angles and permits him to land in smaller areas. The steerable nosewheel and the tricycle gear permits greater ease and speed in taxiing.

The advantages of having the single wheel in front of, rather than behind, the fixed main wheels can be easily demonstrated. Pick up a 25-cent toy airplane of conventional design and whiz it along the floor at high speed. Notice how it falls off on one wing and groundloops. Then

(*Continued on page 100*)

PILOTS appreciate the ease of control achieved through the use of Breeze-engineered Tab Control Systems in the largest aircraft. Fingertip operation of the cockpit unit transmits tremendous controlling force quickly and surely through the entire system to act on flap surfaces.

Here is a system that takes the labor out of flying a heavy ship, that makes possible positive action with a minimum of effort. Whether the problem is to move the large control surfaces of a 50,000 pound cargo ship like the new Fairchild C-82 Packet, or those of a light plane, Breeze engineers and produces the system best fitted to meet the requirements. Compact and light in weight, Breeze quick-acting, fingertip, mechanical controls are built to carry the load. *Your inquiries are invited.*

Breeze

CORPORATIONS, INC.

NEWARK, BREEZE NEW JERSEY

It won't take the Joneses long to learn...

One thing that's sure now about post-war flying is this—*dependability is going to mean more than it has ever meant before!*

YOU CAN RELY ON LYCOMING!

And *dependability* is something the name LYCOMING has always stood for.

***Dependability* born of precision manufacture to the same exacting standards that build the biggest, most powerful of aircraft engines . . . *Dependability* backed by years of private flying experience the world around before the war. *Dependability* proved again today by tens of thousands of Lycoming-powered training and operational planes during the war.**

Yes . . . if you know flying, you know you can RELY ON LYCOMING. *And you know the man on the street will, too . . . when he becomes the "man in the air!"*

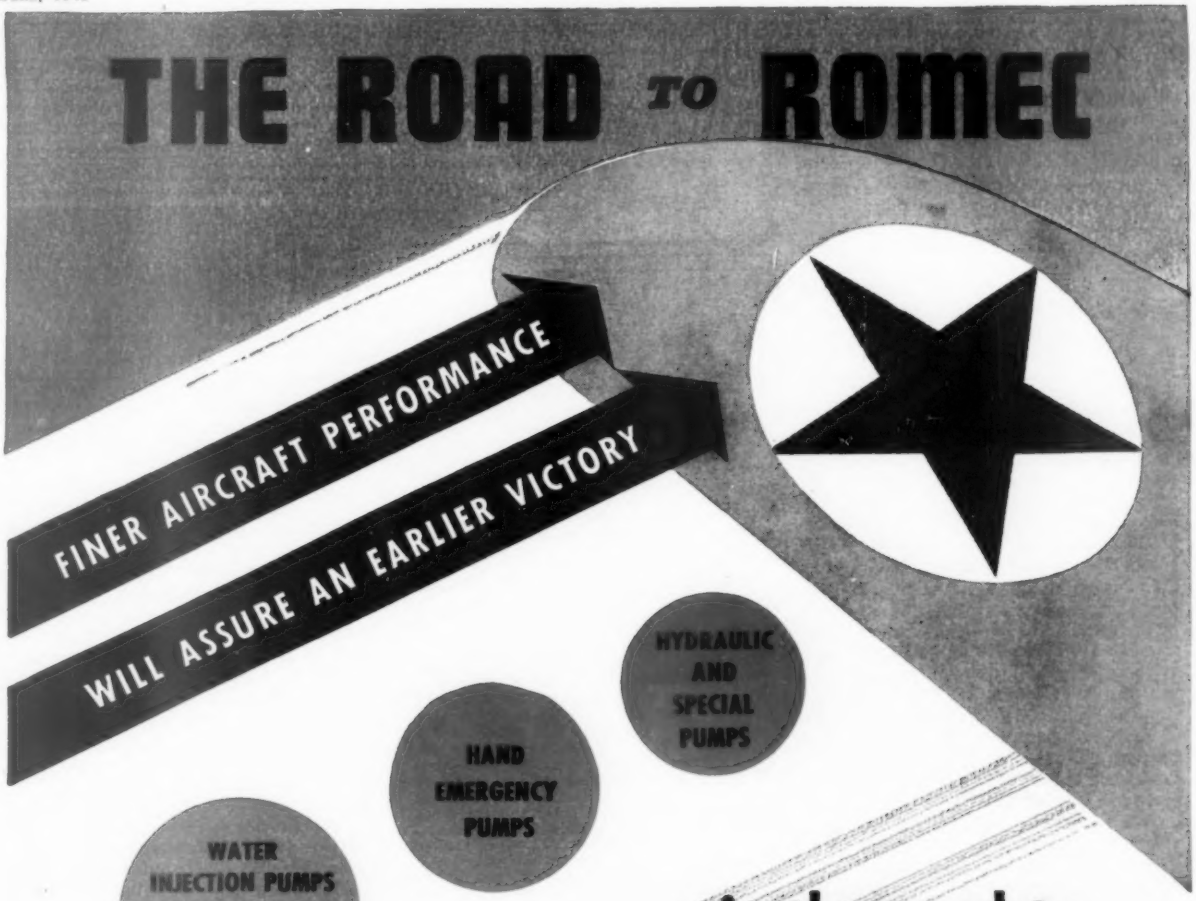
LYCOMING, MODEL O-145
DEVELOPING 65 H.P. AT 2550 RPM.

LYCOMING
AIRCRAFT ENGINES . . . 55-300 H. P.

An Avco Product
Lycoming Division
The Aviation Corporation
Dept. K-8, Williamsport, Pa.

POWERED BY LYCOMING—THE ENGINE WITH A PROVEN PAST AND A SURE FUTURE

THE ROAD TO ROMEC



is the road to BETTER PUMPS

The Road to BETTER PUMPS for Aircraft has long been the Road To Romec.

★ ***FIRST*** . . . with better Water Injection Pumps to step up horsepower and give our fighting aircraft that extra Burst of Speed.

★ ***FIRST*** . . . with Dependable non-pulsation Fuel Pumps that give the pilot confidence in their maximum Reliability.

★ ***FIRST*** . . . with most intricate inspection of every mechanical detail before giving the O.K. for packing and shipping.

★ ***FIRST*** . . . in concentrating EXCLUSIVELY on building better aircraft pumps. Not trying to be jack of all trades.

★ ***And FIRST*** . . . long before Pearl Harbor—in pumping the fuel for round-the-world flights—without showing signs of wear, after circling the globe.

What more can we say about ROMEC PUMPS?

Set Your Budget NOW in support of the 7th War Loan. Then DOUBLE YOUR APPROPRIATION.

ROMEC PUMP COMPANY • 131 Abbe Road • **ELYRIA, OHIO, U. S. A.**

(*Continued from page 96*)

push it down the floor tail first and see how it continues straight and upright.

Again, one of the most difficult features of flying conventional planes is co-ordinating hands and feet in making turns. Weick's patent outlines in detail several methods of overcoming co-ordination troubles by eliminating foot controls without adding work for the hands. One means is to do away entirely with the rudders, replacing them with fixed vertical fins and using the wing spoilers in place of ailerons. The attitude of the spoilers controls both bank and turn. Another method, that used on the Ercoupe, is to link the cables controlling the ailerons with those controlling the rudders in a manner so that a turn of the wheel in the cockpit moves both ailerons and rudders in unison.

These two features have done much toward simplifying flying so anybody can be a pilot. Used in conjunction with Weick's second major patent and other known aeronautical principles, they virtually eliminate dangers of private flying.

In March, 1932, Weick obtained a patent on devices to limit the upward travel of the airplane elevator in such a way as to make a stall impossible while the plane is landing without power or with the engines throttled back. The means for limiting the elevator's movement are varied, but extremely simple. The important feature of the patent is the limiting of the angle of climb to a maximum at which it is nearly impossible to stall.

This is done quite simply, even on a conventional airplane without advanced in-built safety features. The plane is flown at constant power at various increased angles of attack until the one giving maximum lift is found. Any greater angle will lead to a stall. The angle of attack is controlled by the elevator which, when raised, forces the tail down and when lowered forces the tail up. By limiting the upward travel of the elevator to a point at or less than the maximum lifting angle, the pilot is prevented from stalling his plane in a power off or throttled back glide.

A landing can be made simply by pulling back on the power and the control stick and settling in, eliminating the necessity for leveling off and cutting down the length of approach. However, the craft's struts must be built to stand the additional shock of such landings.

Weick points out by way of warning: "The conventional types of airplane balance at a much higher angle of attack with power full on than with power off for the same stabilizer and elevator settings, so that an airplane can attain a much higher angle of attack with power on than with it off. It is, therefore, not usually possible to limit the longitudinal control to a point where a stall and spin cannot be made with power and still retain sufficient control for ordinary flying.

"As a further feature of my invention, however, the possibility of spin with either power on or off is eliminated. This I accomplished by balancing the airplane at approximately the same angle of attack both with power on and off, while still retaining sufficient longitudinal control, by either raising the thrust line the required amount or by taking the longitudinal control surfaces (elevators) and mounting them in position out of or removed from the propeller slipstream."

There is little resemblance between the W-1 and its ultimate refinement, though both use the principles of Weick's patents. The original was a high-wing craft with landing gear struts running from the wing to wheels, a very small cabin and twin booms. It represented the earliest modern use of tricycle landing gear. The W-1A had two control operation using elevator and aileron controls and had in-built features to prevent stalling and spinning. Its pusher engine had a propeller whirling between the twin booms behind the wing, a safety feature that is still desirable but seldom found.

The W-1 was flight-tested extensively in the middle 30's and received considerable attention from the Bureau of Air Commerce, which was then urging the industry to build safety and economy into its planes. John H. Geisse, now CAA's expert on private aircraft was instrumental in having the Bureau purchase the W-1 which was later rebuilt at Fairchild, substituting a flap for a fixed auxiliary leading edge airfoil and including the linkage of rudder and ailerons in one control.

Weick for the first time managed to achieve safety from stalls and spins in the W-1. The wings of the W-1 and the W-1A, and now of the Ercoupe, can stall only at the inner panels, not at the wingtips. This is accomplished by building the airplane in such a way that it will not balance in flight at a high enough angle of attack so the wingtips will stall.

"In the present Ercoupe design the use of the limited upward elevator travel is continued," Weick explains, "and in addition, the exact manner in which the wings approach the stalled condition has been treated carefully. A straight wing is used, the stalling of which naturally starts at the middle of the span. With the low-wing monoplane arrangement used, the stalling or breaking away of the airflow is sure to start at the juncture of the wing with the fuselage if no fillet is used—the air speed and angle of attack at which the breaking away of the flow starts can be controlled by proper filleting."

To determine the type of filleting, or fairing between fuselage and wing section, Weick carried out flight tests with different types of fillets, using tufts on the upper surfaces of the wings to observe the action of the airflow under conditions approaching stalling. With the fairing finally chosen, the airflow starts burbling at the trailing edge of the wing at the juncture with the fuselage as the plane reduces speed near the minimum and spreads out fanwise from the fuselage as speed is further cut. The outer portion of the wing does not stall, so that aileron control is satisfactory in a glide even with the control wheel full back.

Weick explains that lateral stability is achieved through these three factors: 1. As the spanwise distribution is broken down in the center, the outer wing panels act like two low-aspect-ratio airfoils, thus automatically increasing the stalling angle of attack. 2. The pitching moment of the main wing changes as the center portion stalls, and this tends to decrease the plane's angle of attack. 3. Downwash of air on the tail is reduced, which cuts down the effectiveness of the elevator in depressing the tail.

The Ercoupe's tricycle landing gear is built ruggedly with a wide span between main landing wheels and with a foot of travel in the struts, making the plane almost as stable on the ground as an automobile. It will stand the shock of more than double minimum landing speed, which is 45 m.p.h.

Pilots of conventional planes miss the Ercoupe's inability to sideslip. In fact, the most difficult phase of flying the plane

(*Continued on page 104*)

the British Say...

TWO Curtiss YP-60E single-engined fighters were ordered by the AAF, but the order was cancelled after the delivery of one airplane. . . . A Boeing *Superfortress* has been powered experimentally with Allison engines. . . . Latest version of the North American *Mustang*, the P-51K (also the F-6) carries an F-24 camera as well as six .50-cal. guns. . . . DeHavilland *Mosquitoes* of an 8th Air Force photo reconnaissance unit based in Britain recently completed 91 night missions. . . . Current versions of the P-47D *(Thunderbolt)* have a top speed of 399 m.p.h. at 28,000 feet and 420 m.p.h. at greater altitudes. Range is 750 miles at 250 m.p.h., which can be increased by use of external tanks. . . . The RAF-operated *Flying Fortress II* and *IIA* are equipped with cannon. . . . Gross weight of the SB2C-1 (Curtiss *Helldiver*) is 10,982 pounds, for the SB2C-3 it is 11,000 pounds. . . . The Culver *Cadet* is being used by the AAF as a radio-controlled gunnery target plane, and is powered with an 80-h.p. Franklin 4AC-176 engine. . . . The Consolidated *Seawolf* (TBY-2) torpedo bomber carries a crew of four and has a gross weight of 16,000 pounds. . . .

—THE AEROPLANE SPOTTER.

The new U.S.S. *Bon Homme Richard* will carry about 80 aircraft, among them new Grumman *Tigercat* (F7F) twin-engined fighters and Consolidated *Seawolf* torpedo bombers. . . . Five Focke-Wulf Fw-190's, each with an explosives-loaded Heinkel He-111 attached to their undersides, recently were shot down by *Mustangs* of the 55th Fighter Group of the AAF 8th Air Force. . . . *Mustangs* operating in the Pacific area now can carry a 500-pound anti-sub depth bomb under each wing. . . . The 2,600-h.p. Allison V-3420 engine will not go into production. . . . Two new Navy night fighters now in combat are the F7F-2N (Grumann *Tigercat*) and PV-2N (Lockheed *Harpoon*, a development of the *Ventura*).

—THE AEROPLANE.

The Douglas *Skymaster* (C-54B in the AAF, R5D-2 in the Navy) cruises at 204 m.p.h. on its four 1,450-h.p. *Twin Wasp* engines, at a gross weight of 73,000 pounds. . . .

—AIRCRAFT RECOGNITION.

THERE ARE NO SIDETRACKS IN THE SKY

Cargo by the ton flies straight to its destination in the "Packet," the Army Air Forces' cargo carrier designed by Fairchild and built by Fairchild and North American Aviation.

Into the spacious hold of Fairchild's "Packet" will go lethal loads of guns, tanks, paratroopers, ammunition and supplies—destination Japan.

It is nicknamed the "flying boxcar" because of its cargo capacity—2,312 cubic feet of space—and its ability to carry up to nine tons at speeds which are still restricted information. Its maximum range, with conservative loads, is approximately 3,500 miles.

Forty-two paratroopers with full equipment can be "delivered" through two rear jump doors, clear of any obstruction. An ingenious device sends equipment parachuting through special doors in the belly, simultaneously with the paratrooper's jump.

The "Packet" is loaded with extreme ease. The floor of the fuselage is parallel to the ground and at standard truck floor height. Two 2100-horsepower engines impel its flight on wings that span more than 106 feet. Its overall length is more than 75 feet and its height 26 feet.

With but minor changes, it will become an efficient and profitable carrier of cargo and passengers in peacetime, flying the main lines with never a wait on a siding.

All metal in construction, this flying boxcar possesses characteristics inherent in all Fairchild products, "the touch of tomorrow in the planes of today."

BUY U. S. WAR BONDS AND STAMPS

Fairchild Aircraft

Division of Fairchild Engine & Airplane Corporation, Hagerstown, Maryland

"Oh, well—nothing ventured, nothing gained"

Everybody in aviation is familiar with the story that crops up about every six months of the engine that is "too powerful" for any plane. But somehow it never seems to take very long before somebody is flying a plane that takes all the power of the new engine—and even could use a bit more.

The point is that there just doesn't seem to be any limit to the amount of power the plane designers can *use*. What's more, the possibilities for developing more power through better than 100-octane gasoline also seem practically limitless.

For a time it seemed that aviation gasoline quality had leveled off at 100-octane number, but there is actually no such ceiling. Already, through the use of new processes and Ethyl fluid, petroleum refiners are producing gasoline of better than 100-octane. Thus it seems likely, that the post-war aviation industry will see gasolines of higher and higher antiknock quality and engines of higher and higher power.

Ethyl Corporation

CHRYSLER BUILDING, NEW YORK CITY

EVEN ENGINEERS ARE FROM MISSOURI . . . Until they Fly behind it!

This Variable Pitch "Propeller with a Brain" Works Wonders in Performance . . . Automatically

YES, we can give engineers technical data from which they can figure, with mathematical precision, exactly how and why the Aeromatic Propeller works. *But it still seems too good to be true . . . until they fly behind it!* Then they get the feel of what they've figured and . . . YEAH MAN!

In terms of performance for your postwar plane, Aeromatic means one-fourth shorter takeoff runs . . . one-third higher rate of climb . . . cruising faster and farther at the most favorable altitude . . . all with minimum fuel consumption and engine wear. And it means long glides for happy landings . . . with an instantaneous change of pitch for a quick pickup if you overshoot the field.

What's more, it's important to remember that the Aeromatic Propeller requires no instruments . . . no controls . . . nothing extra for you to watch or do. It's the one and only propeller that lets your plane and engine deliver . . . automatically . . . *all* the performance that is built into them.

If you fly, or plan to fly, you'll want an Aeromatic Propeller on your plane. Write to your aircraft manufacturer about it today. And if you'd like our little get-acquainted folder, containing a diagram of the "brain" in an Aeromatic Propeller, don't hesitate to write to Aeromatic, 274 Scott Street, Baltimore 3, Maryland.

The Propeller with a Brain for Tomorrow's Plane

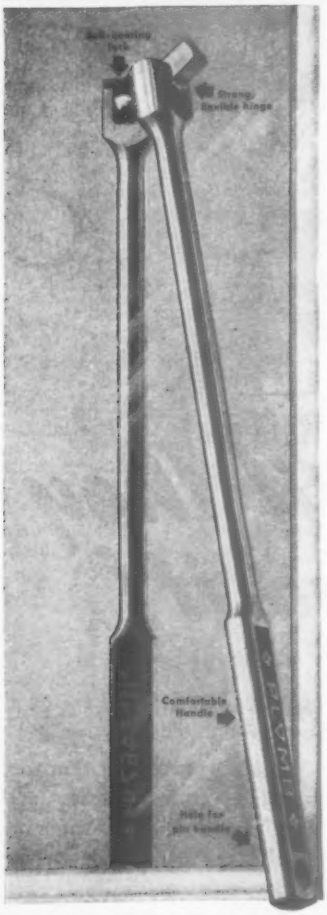
Aeromatic

Air Controlled Automatic Propeller

KOPPERS COMPANY, Inc., BARTLETT-HAYWARD DIVISION

Licensed under patents of EVEREL Propeller Corporation

PLOMB
Forged
HINGE HANDLE



RUGGED...YET FLEXIBLE AS YOUR WRIST

Here's the improved Plomb Hinge Handle...forged to reduce weight and to increase strength and long-lasting qualities. Made in varied lengths in standard drives, it's guaranteed to give complete satisfaction, like all tools in the famous Plomb Line. Get it today at your Plomb Distributor... Plomb Tool Company, 2219 Santa Fe Avenue, Los Angeles 54, California.

PLOMB
FINE HAND TOOLS

(*Continued from page* 100)

is in making the landing approach. Pilots can usually lose altitude as fast by making sharp S-turns as they can by fishtailing in conventional planes. The plane almost seems to flutter down, like a falling leaf. The confusion is in landing against a crosswind. The plane will naturally caster around in the direction of landing, provided no effort is made to control it at the moment of contact. Pilots unused to the plane are likely to try to turn from the crabbed position onto the runway before contact, forgetting that the turn not only banks the plane but turns the front wheel. Result: smashed wingtip and propeller. The few landing accidents that have occurred in Ercoupes have stemmed primarily from that misconception.

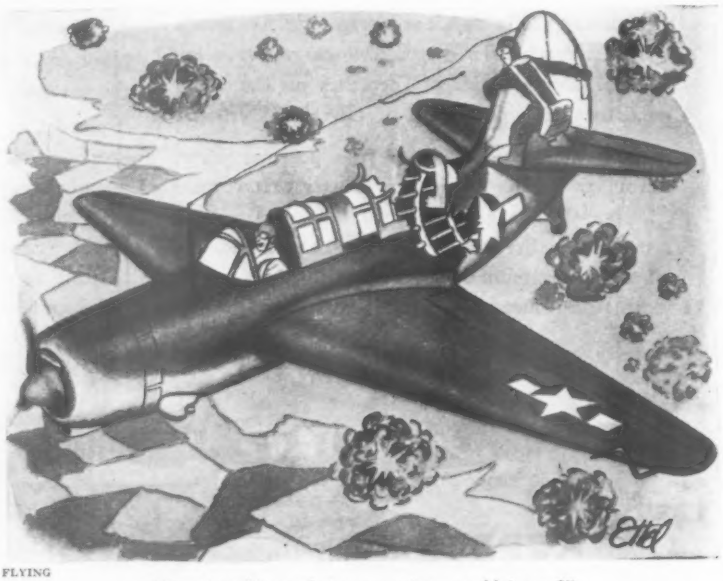
At 90 m.p.h. the plane will land without a tendency to balloon off the ground. At even faster speeds it can be kept aground by holding the control column full forward after contact. Take-offs are made either by leaving the wheel in neutral until after flying speed has been reached and then easing back on the stick, or by holding the wheel full back for the entire ground run. In the latter method the tail will not depress until flying speed has been reached. Held full back, the plane will alternately climb and level off till more flying speed is reached, then climb and level off.

Both the CAA and Parks Air College have conducted controlled programs to determine the length of time it takes beginners to earn their solo permits and private licenses with the Ercoupe, as contrasted with that required in other lightplanes. Present limits are five hours dual time before solo and 25 hours for the private certificate. The Parks test, in which 56 students ranging from 20 years to 60 participated, indicates the experience requirement could be safely cut to four hours and 20 hours. Equivalent time on conventional craft is eight and 35 hours.

The plane's utility value is on a par with others in the same weight and horsepower class—1,250 pounds gross weight and 65-h.p. engine. At cruising speed of about 100 m.p.h., it averages some 23 miles on a gallon of fuel. Weick himself admits, however, that a cross-country trip against any considerable headwind cuts its speed down to that of a modern car and raises per mile gas consumption. But he points out that the airplane doesn't have to follow the roads; it can travel directly from point to point.

A few improvements are planned for early production of peacetime Ercoupes. A self-starter will be added if an engine of increased horsepower can be developed that will be capable of operating a generator and overcoming the weight disadvantage of the added equipment. Some thought is being given to installing a brake pedal on the floor and eliminating the hand brake. Some time in the far future, Weick hopes to muffle the engine and soundproof the cabin more effectively. Minor changes will be made on the landing gear to do away with difficulty experienced with mud caking between wheels and wheel forks. Wartime experience with mass production has pointed up many improvements in production methods which will enable Erco to produce the same plane in fewer man-hours.

Meanwhile, other manufacturers will not stand still. Competition that produced the Ercoupe will force others to produce planes its equal or better. Eventually the public will be able to purchase the kind of planes it needs and wants. The question is not by whom but by when. It is important that the public, which is now enormously air-minded, not be disillusioned. That is the challenge the Ercoupe offers to the industry. END



FLYING

"Boy, I could see that one coming—couldn't you?"

Sets New Standards for DEPENDABILITY *and* ECONOMY

FLYING Curtiss Commandos 10,000,000 miles, largely over water to South America and Africa, Eastern Air Line pilots, operating for Air Transport Command, never missed a scheduled flight because of adverse weather conditions.

That's equal to 400,000,000 passenger miles, but it is only a small portion of the tough war mileage which has tested and proven the Curtiss Commando to make it the most advanced transport available for peacetime air fleets of the world.

World's largest and fastest twin-engine passenger-cargo airplane, the Commando will seat from 36-42 passengers, yet have 526 cubic feet of cargo space to accommodate anticipated 1400% increase over the prewar level in mail and cargo during the immediate postwar years.

With its twin-engine economy, the Commando will produce profits when flying with far less than maximum payload—show greatly accelerated revenue as payloads approach or attain full capacity—is the most economical airplane to operate on flights whose range accounts for more than 90% of all domestic air travel. Curtiss-Wright Corporation, Airplane Division.

Curtiss Commando

Passed the toughest tests ever given a Transport Plane

U. S. Navy's Grumman Hellcats Return from a Raid

Grumman

AIRCRAFT ENGINEERING CORPORATION, Bethpage, L. I., N. Y.

How Not to Run an Airport

(Continued from page 35)

One of the worst-kept airports FLYING's photographer visited, for example, charges $25 a month hangar rental for a *Cub*, although the plane's owner has access to a single toilet dirtier than the worst backwoods privy.

The four airports featured here were selected by FLYING's editors because they are some of the busiest airports in a large metropolitan area catering to the private pilot and plane owner.

Just these four airports hangar 135 airplanes of all sizes (75 per cent are lightplanes), distributed as follows:

Airport A.....32
Airport B.....20
Airport C.....28
Airport D.....55

Nothing in any of the photographs accompanying this article was posed or specially set up in any way; the photographer simply walked on the scene and photographed things he saw.

Aviation insurance officials, and CAA inspectors familiar with the airport situation generally, when shown these pictures, were unanimous in saying that such conditions are the rule, not the exception. Further proof of this fact was a recent CAA report on the outlook for post-war employment in aviation, which said in part:

"Airport management and maintenance has new importance in the aviation employment picture. The old, slipshod methods can no longer survive. Airports must adopt business principles comparable to those in older and established businesses."

An almost complete lack of business principles is to be found at the average fixed-base operation. If FLYING's survey of the average airport's "customer relations" is any indication, few fixed-base operators know the meaning of the words. FLYING correspondents visited several airports catering to the private pilot and found that service to the customer, as practiced by progressive business establishments in other branches of industry, is non-existent. Plane rentals are unduly high, hangar rentals are universally high, frequently exorbitant. Restaurant food—when available at all—is expensive and of low quality. An inquiring customer—who invariably has had to drive or hitch-hike 10 or 15 miles to get to the airport—usually gets pushed around or ignored.

The four airports covered by FLYING quoted the following monthly hangar rentals:

Type of Plane	Airport A	Airport B	Airport C	Airport D
Piper Cub	$25	$20	$15	$20
Stinson 105 Rearwin Fairchild	30	25	17.50	25
Stinson SR Beechcraft D17 Howard	40	30	25	30

The cost of maintenance and repair work, meanwhile, is enough to drive the average air-minded working man back to the automobile for the rest of his life. Despite such unbelievably bad working and shop conditions as are shown in several of the photographs accompanying this article, the four airports quoted the following estimated charges for a major overhaul on an engine of up to 80 h.p. (the average is 65 h.p.):

Airport A.....$350
Airport B..... 300-$350
Airport C..... 250- 400
Airport D..... 180- 500

Here, then, is concrete evidence of one of the most important things that is wrong with private flying. While it is the popular practice to blame the CAA and CAB for nearly everything that is holding back private flying, the record indicates that—in this case at least—the complainant actually is the guilty party.

Recently the National Aviation Trades Association asked aviation writers to discard the term "fixed-base operator" in favor of "aircraft service operator." For the time being, at least, FLYING feels that the majority of such operators still are "fixed-base." It is such a rarity today to get real "service" at an average airport that the use of the word in identifying operators is stretching the imagination. END

MALLDRILLS pack the wallop that counts in heavy production or general maintenance work . . .

★ Rugged construction for long, hard, continuous drilling of metal, plastics and wood.

★ Special steel alloy gears and self-lubricating bearings assure increased speed, cool operation, and long service.

★ Light weight and compact design reduce worker fatigue. Also add to adaptability of drills.

★ Easily serviced—commutator can be inspected and brushes replaced without dismantling drill.

★ ¼" and ½" capacity models are available for 110-volt A.C. or D.C. or 220-volt A.C. or D.C.

★ Available on suitable priority.

Ask your Supplier to write for literature and prices.

ARMY E NAVY

MALL TOOL COMPANY
7771 South Chicago Ave., Chicago 19, Ill.
Offices in Principal Cities

Mall REG. U.S. PAT. OFF. PORTABLE POWER TOOLS

We Must Invade Japan

(*Continued from page 23*)

this means that the whole of our Navy air force can be concentrated in one locality for combat. Thanks to this flexibility of the carriers we can concentrate, and keep more continuously in the sky, a larger force of planes than the Japanese can concentrate with their land-based planes scattered on fields throughout the 1,500 miles from the southern end of Kyushu to their northern boundary of Karafuto (Sakhalin).

With the capture of Luzon we have finally obtained an island large enough to be used as a land, sea and air base for an attack on Japan, just as we used Britain for such a base for our attack upon the continent of Europe.

We now can do one of two things. Either we can land in China with the intention of making a junction with the Chinese troops operating against Japan, fight our way north, overcome the Japanese land and air forces on the continent of Asia and then invade Japan proper.

Or—thanks to the new powers developed by our Navy to go anywhere in the Pacific—we can invade Japan directly.

In the Pacific we have had nothing but successes these past two years. These have all been due to the simultaneous combined use of ground troops, warships and aviation, operating to defeat decisively the ground troops, warships and aviation of the Japanese.

On the continent of Asia, on the contrary, our side—except for a few minor successes—has experienced nothing but defeat. We have relied on China to build up a ground force able to defeat the Japanese ground forces. At the same time we have attempted to build up an American air force which could attack the Japanese air and ground troops in China, their sea lanes of communication between Japan, the Malay Peninsula, the Dutch East Indies, as well as the home islands of Japan.

The army of Chiang Kai-Shek lacks sufficient artillery, tanks and aviation. The driblet of supplies and munitions which could be sent over the Burma Road before the Japanese cut it, and which can be sent over it, now that it is open again, is not sufficient to supply what Chiang's troops need to defeat the Japanese.

The driblet which could be flown over the "Hump" was insufficient really to maintain the air force which we had in China, much less build it up to a point where it could perform the missions assigned to it.

There is no way in which the necessary supplies and munitions can be delivered to Chiang Kai-Shek's army and the American Air Forces in China unless we land on the coast of China with sufficient ground forces to fight our way to the Chinese army 700 to 800 miles away from the coast. To do this we would have to land enough troops to whip the Japanese troops in China and any reinforcements which they chose to send from Manchuria, Korea and the home islands.

Admiral Nimitz recently warned that only 10 per cent of Japan's army has been committed to the defense of the islands we have captured.

Four things make any help we can expect from the Chinese of relatively small value:

First, Chiang Kai-Shek and the Chinese Communist armies in northwest China do not trust one another. In fact, their best troops are facing each other, rather than fighting the Japanese.

Second, the Chinese puppet government, the territory of which lies between the Chinese coastline and Chiang Kai-Shek's army, has a considerable number of Chinese troops armed and trained by the Japanese.

Third, any ground troops landed in China would soon be so far inland that they could get no air support from the carrier-based planes of our fleet.

Fourth, even after the end of the European war, both AAF and RAF planes will have to wait until the airfields needed for their use have been prepared and the tremendous amount of ground personnel, supplies and materiel of all kinds has been sent approximately 10,000 miles by ship.

While many expect Russia to enter the war against Japan when Germany is defeated, we have no guarantee that she will do so. If reports are correct, the question was not even considered at Teheran or Yalta. Even if she does, her airfields in eastern Siberia are inadequate to handle the AAF and the RAF.

Few people outside of the military services and even some of those in them who have never had to work out any of the problems of logistics realize that they are the determining factor in what can be done in war. It is easy to point out on the map where warships, airships and ground troops should be sent and to say how much of each is necessary to defeat the enemy's forces in whatever region is chosen for attack. Whether such movements of combat forces can be made in the first place and, in the second, whether these armed forces can stay there and fight depends entirely upon the solution of the logistic problem involved.

The whole question of what help Russia's armed forces can give us should she decide to go to war with Japan once the war with Germany is finished, depends entirely upon her ability to put and maintain her armed forces in eastern Siberia.

The logistic problem of a ground force today is far greater and more difficult than was true of the war of 1914-1918. In that war it was much more difficult than in the Russo-Japanese war of 1904-1905, fought in Manchuria and Korea.

The amount of armament and ammunition supply for a given number of infantry soldiers has tremendously increased and the number of artillery cannon and their ammunition supply is many times greater. Added to this is the tremendous quantity of materiel and fuel needed for the armored forces, including tanks and their ammunition supply.

In other words, the logistic problem

ZEBRA-COBRA

STRIPED *Airacobras* equipped with gun cameras are being used in the "surprise-proofing" course at Las Vegas Army Air Field, Nev. Purpose of training is to keep airmen constantly on the alert against surprise attacks.

The gaudy fighters (also see page 70) "attack" bombers such as the *Flying Fortress* shown, at any time and from all angles. Bombers out for routine flights or test hops are also prey for the Zebra-Cobra.

Devised by the AAF Western Training Command, the camera records from the bombers and fighters indicate the degree of alertness maintained by bomber crews.

Now and Tomorrow...

GENERAL AVIATION DISTRIBUTORS BRING PRIVATE FLYING A BRIGHTER FUTURE

● Few factors are building more surely toward the successful expansion of nation-wide private flying than the progressive service standards being encouraged at airports where General Airplane Tires and products are handled. For flyers have *confidence* that where Top-Quality GENERALS are sold, ground service and facilities are *best,* also.

General's Aviation Distributors select airport retailers by strictest service standards . . . and because comprehensive Distributors' stocks eliminate the need for costly airport stocks . . . fixed-base operators' funds are released for adequate service expansion.

This policy is supported even during wartime by complete, strategically located distributor stocks . . . coast-to-coast . . . and the ground service system, which Generai is helping to build, promises the new flying public of tomorrow airport facilities matching the famous quality and safety of The General Tire.

Aviation Division

THE GENERAL TIRE & RUBBER CO.

AKRON, OHIO

The **GENERAL** AIRPLANE TIRE

KNOWN ROUND THE WORLD FOR QUALITY AND SAFETY

MEN OF ACTION WEAR CALOBAR SUN GLASSES

IN sun-brilliant stratosphere... or cutting an incandescent swath across a glittering sea... dazzling glare can hide enemy activity—and prove a source of deadly danger to unprepared fighting men.

That's why the *glare protection* of Calobar Sun Glasses is vital to our Armed Forces. Calobar lenses are *optically* ground and polished. Their special formulation admits plenty of "seeing" light... while tempering blinding light... and absorbing infra-red (heat) and ultra-violet (sunburn) rays. And their sturdy frames, tops in wearing comfort, provide a full range of vision.

Production of Calobar Sun Glasses today is for Army and Navy aviation personnel only. After the war, they will be available to all, through those who give professional eye care ... and to fliers from airport sources. Your fixed base operator will then be able to supply you.

Official U. S. Navy Photo

AO CALOBAR SUN GLASSES
Optically Safe

American Optical
COMPANY
World's Largest Makers of Ophthalmic Products

BUY WAR BONDS AND STAMPS

for, say, an army of 1,000,000 Russian ground forces in eastern Siberia, with the aviation support which the Russians habitually give their ground troops, is many times greater than would have been that same problem in the Russo-Japanese War of 1904-05.

According to the best available reports the Trans-Siberian Railway is not yet completely double-tracked beyond Nizhneudinsk, approximately 400 miles northwest of Lake Baikal. From that lake to Chita, approximately 350 miles east, it may be double-tracked.

When this writer went over the Trans-Siberian there were long sidings, but it was largely single track, curving right and left along contours to avoid cuts and fills. From Moscow to Chita—which is east of Lake Baikal and possibly the center from which the Russian armies would operate against Manchuria—is well over 3,000 miles. From Moscow to Vladivistok is perhaps 5,000 miles.

In the Russo-Japanese War of 1904-05, the maximum capacity of this railroad to supply the Russian army was reached when they had about 600,000 troops in Manchuria. This was one of the main reasons why Russia agreed to President Theodore Roosevelt's offer to mediate between that country and Japan. This same supply problem also impelled the Soviet Government to build up two armies in Siberia and attempt to make them self-sustaining. The Russians have not, however, been able to build up the industries necessary to supply these two armies in Siberia. There is little doubt, too, that most of the troops of these two armies have had to be sent to Europe to fight the Germans just as in the last war.

None of the Japanese defeats in the Pacific Ocean area have impaired her strength on the continent of Asia. On the contrary, as she suffered these defeats at sea and on the Pacific Islands Japan strengthened her position on the mainland. They have covered it with a network of railways and airfields. They have completed the rail communication between Thailand and the Burma rail system. They have now seized French Indo-China. As the French Indo-Chinese railways connect with the Chinese railway system to the north and the Thailand railway system to the south, the Japanese now have rail communications from northern Manchuria down to Singapore and over to their front in Burma,

In the widespread publicity resulting from our recapture of the Philippine Islands we have been told a great deal about how we have cut Japan's line of communications between her home islands and her occupied areas in French Indo-China, the Malay Peninsula, Burma and the Dutch East Indies. There has been almost a complete failure, however, to emphasize the fact that these are sea lines of communication. Japan's land communications remain intact.

If we choose to invade China we will have more of a problem ahead of us than we did when we landed in France. It would mean the invasion of a continent.

However, this invasion would be much more difficult. When we landed in France we faced an enemy which had already

New 1945 Link Trainer, not only teaches instrument flying but, according to pilots, "flies more like an airplane than an airplane does!"

Mission Completed, Plane Safely Home!

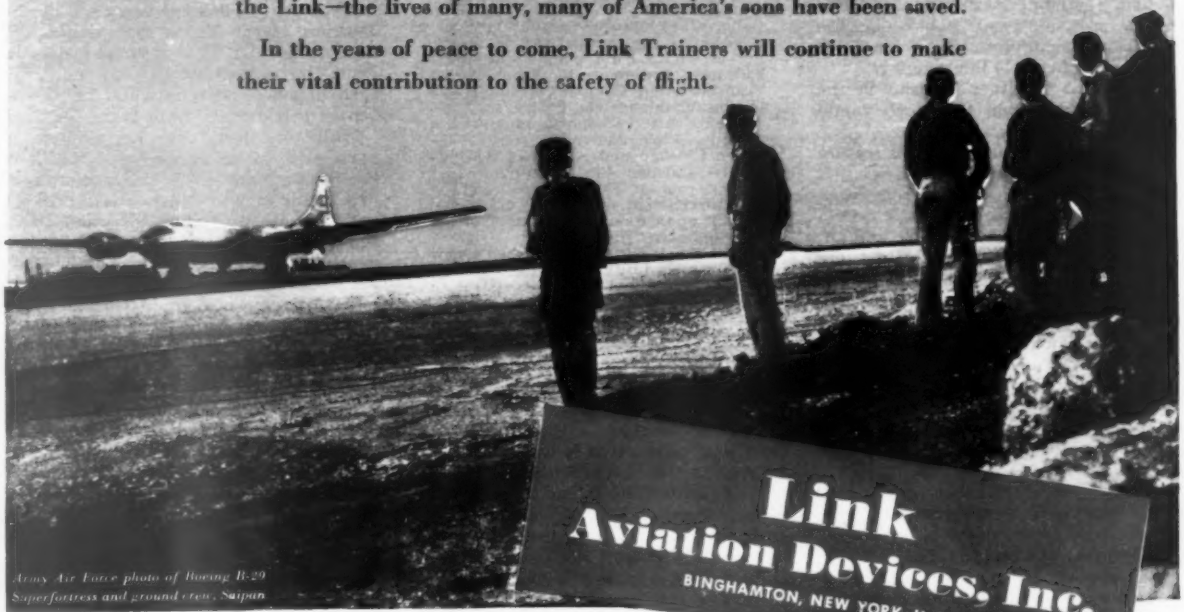
To the ground crew sweating it out for the bomber's return, to the Air Force Commander and the folks back home, there are no words so thrilling as "plane returned safely."

In this short phrase are condensed all the months of arduous pilot training...all the ingenuity of engineer and skill of aircraft worker...all the devotion and know-how which have invested with maximum safety the fine and scientific art of flight.

Safety in flight is the solid base upon which our vast air force operations are built. It is the reason-why of Link training for *all* air force pilots. In the Link, our pilots learn to cope with emergencies of darkness and weather, to fly safely and surely *by instruments alone.*

Millions of costly hours of flying time in training planes have been saved by instrument instruction in the Link *on the ground.* Millions of gallons of precious aviation fuel have been conserved for combat missions. And most important of all—because there are no casualties in the Link—the lives of many, many of America's sons have been saved.

In the years of peace to come, Link Trainers will continue to make their vital contribution to the safety of flight.



Army Air Force photo of Boeing B-29 Superfortress and ground crew, Saipan

Link Aviation Devices, Inc.
BINGHAMTON, NEW YORK, U. S. A.

LINK MANUFACTURING COMPANY, LTD.
GANANOQUE, ONTARIO, CANADA

Makers of Link Trainers, Crew Navigation Trainers and other Devices contributing to the safety of flight

been fighting on a scale far beyond anything that the 90 per cent of the Japanese Army which has not yet fought us has encountered from the Chinese.

In addition, when we landed in France our enemy had the large and powerful Russian army and air force on its back. If we land in China we do not know that the Russians will attack the Japanese at all. We know that if they do go to war the logistic problems they will have to face will take probably at least two years to solve. Only then will they be able really to attack the Japanese.

If we land on one of the main islands the Japanese will be able to bring no great concentration against us. Why? First, because any island invaded is separated from the other main islands of Japan by water as was true in the Philippine Islands. The Japanese did succeed in getting some reinforcements from one island to another in the Philippines but it was extremely difficult in the face of our sea and air power. In no case was it decisive.

In the second place, all of the Japanese Army is not now concentrated in the four main Japanese islands. A very large part of it is on the mainland of Asia from Manchuria in the north to the Malay Peninsula in the south. In North America this would be the equivalent to the distance from our states along the Canadian border west of Lake Superior to as far south as the Panama Canal.

It would take a considerable length of time to withdraw these troops from the continent and concentrate them in Japan proper. Long before this could be done we could seize several of the Japanese main islands.

Also, the position of the Japanese islands lends them to strategical blows of great importance, while landing somewhere on the coast of China would not produce a prompt strategic return any more than landing somewhere on the beaches stretching from New Jersey to Georgia would cripple this country.

The seizure of either Kyushu in the south or Hokkaido in the north would greatly weaken Japan's position.

The landing in Kyushu and its seizure would open up Japan's Inland Sea. It would open the Tsushima Straits between the main islands and Korea. It would allow our sea force, both surface and air, entry into the Sea of Japan and the Yellow Sea and thus seriously interfere with, if not decisively cut all communications between Japan's four main islands and the mainland of Asia.

In preparation for such an attack there is now nothing to prevent our capturing more islands for air bases either to the south from Formosa to include the Ryukyus or the Kurile Islands to the north.

Such an attack on Japan proper only needs to wait until we can bring sufficient ground troops from Europe after the war with Germany is over.

Until one of Japan's main islands is captured by us her sea position, insofar as her home waters are concerned, is a very strong one. The Sea of Japan and her Inland Sea are closed to our fleet.

An examination of the accompanying map shows that all entrances to both seas are through narrow passages with Japanese islands on both sides. All these passages can be easily covered by coast defense artillery with the exception of that between Korea and Japan proper. All of them are closed by submarine mine fields.

On his trip to Washington, Admiral Nimitz also said that while the Japanese Fleet has been greatly weakened it still remains a threat to Allied operations in the Pacific theater.

As long as it exists it will continue to be such a threat, particularly when we invade Japan. The Inland Sea and other home waters of Japan give it plenty of room in which it is safe from any attack by our fleet, even if not from our air.

In the last war, the German fleet preferred to stay within its harbors and finally surrendered only after the Armistice was signed and its officers knew it would be only a question of time until Allied troops surrounded those harbors.

While this occurred before aviation was very far developed, the fact remains that up to the present air attacks alone have not succeeded in destroying enemy naval power. For many months, despite British air power, one of Germany's pocket battleships used different Norwegian fjords from which to raid the Murmansk convoys successfully. When finally put out of action by a block-buster it was tied up in a narrow fjord with no room to maneuver. The best example, however, consists of the two German warships lying in the Harbor of Brest which were bombed again and again but nevertheless put to sea one day, steamed around the Breton Peninsula, up the British Channel, into the North Sea and, undestroyed, safely put into one of their home ports.

There are no European ports or fjords comparable in size with Kagoshima Bay and the Inland Sea of Japan. The Japanese Fleet can move around to avoid air attack while still safe from direct attack by our warships in a way that is impossible anywhere in Europe. In addition, the Sea of Japan, all the entrances of which are blocked by mines and submarines, gives ample room to move around in the same way that the Baltic has given the German Fleet plenty of room. These remnants are still being used against the Russians as this is written.

The recent attack by our fleet aviation on that portion of the Japanese Fleet found in the Inland Sea confirms the necessity to land ground troops in Japan proper if we are really to make an end to her remnants of sea power.

The Navy's report on this attack lists as "sunk" only six small freighters. The warships listed are only claimed to have been "damaged." Only a continuation of such raids without stop can prevent this damage from being repaired.

Much greater damage was done by the Japanese air attack on that part of our fleet cooped up in the small waters of Pearl Harbor, yet only a continuation of such Japanese attacks could have prevented this damage from being repaired.

While our fleet does not hesitate to move as it wishes in the *broad* waters of the Pacific it cannot, in the face of Japanese mines, submarines, coast artillery and land-based aviation carry out by itself an operation which would *permanently destroy* the Japanese fleet, all Japanese naval repair installations and take possession of them.

There are other Japanese naval installations on the main island of Japan and on the other Japanese islands which have not yet been damaged.

Aviation, *like all other arms*, is constantly being developed during the war and now, in the case of British bombers, has reached the point where 22,000-pound bombs can be dropped on the enemy. Yet the fact remains that the longer the war has gone on in Europe the more the evidence accumulates that such bombing, while increasing the number of ruins within the enemy's country, cannot produce a decisive military result.

Even should the remnants of the Japanese Fleet be destroyed by such bombing and thus entirely remove the menace of which Admiral Nimitz spoke, Japan's

5 YEARS AGO

FROM the June, 1930, issue of this magazine:

The Department of Commerce ruled that candidates for limited commercial or transport licenses must possess perfect natural eyesight. Natural sight of 20/40 correctable to 20/30 permitted issuance of private licenses.

Goodyear blimps were advertised as "aerial yachts." Maintenance cost, it was claimed, was no greater than that of a small yacht. Personnel required: one or two pilots—plus a ground crew of from six to 15, depending upon weather conditions. Cost of a five- or six-passenger airship: about $60,000.

Harris M. Hanshue, president of Western Air Express and Fokker Aircraft Corp., predicted 12-hour flight from Los Angeles to New York at a cost of only $50. WAE records showed 25,000 passengers carried in 1929 as compared with only 267 in 1926.

Ireland Aircraft announced the two-place *Privateer*, an amphibian which could be powered with either a Le-Blond 90 or Wright *Gypsy* engine. A low-wing, pusher monoplane, it had a top speed of 81 m.p.h., cruised at 70 and landed at 40. It sold for $5,550.

The *Hornet*-powered *Fleetster* monoplane built by Consolidated attained a 225 m.p.h. speed in trials at Washington, D.C.

In a story entitled "Japan Is Not Air-minded," Author E. Percy Noel stated the average Japanese could not conceive anything to equal Occidental flying activity. First commercial flight had just been made by Japan Aerial Transportation Company from Tokyo to the mainland via Osaka.

Boeing Air Transport announced a 20-hour, $200 passenger service between Chicago and San Francisco, using 18-passenger Boeing tri-motors.

Fines totaling $550 were collected by the Government during the first three months of 1930 on 122 violations of the Air Commerce Regulations.

Miss Laura Ingalls established a new world's record by performing 344 loops over Lambert-St. Louis field.

On the "tough-nuts" Watch a Snap-on Go to Work!

In the sleekly streamlined structure of a modern plane, *tough nuts* are plentiful. Blocked, hidden, fox-holed in sharply restricted spaces, they defy ordinary wrenches to "reach in and do a job".

Along aviations' assembly lines and in maintenance shops, *watch the Snap-ons go to work!* Slim, flexible, dexterous, Snap-on "combinations" by-pass obstructions, slip into tight and tricky places, grip hidden nuts securely, turn them swiftly, solidly and *safely.*

Because they speed the toughest nut turning job, and because their versatility frequently eliminates the need for specially designed one-job tools, Snap-on wrenches have earned preference in every branch of aviation. Write today for 1945 catalog of 3,000 Snap-on tools for production, assembly and maintenance.

SNAP-ON TOOLS CORPORATION
8024-F 28th AVENUE KENOSHA, WISCONSIN

powerful position on the Continent of Asia and her own islands would still remain secure.

One of the oldest military strategic principles in the world is to concentrate the maximum amount of military force against the enemy. In Europe we have not been able to use the tremendous power of our fleet and its air force with its tremendous carrier-borne mobility. In the Pacific we have our choice of fighting on the continent of Asia and consequently being in a position similar to that in Europe where we cannot use this tremendous power, or of striking directly at the heart of the enemy with the full power of our ground forces, with a large part of our aviation, and with the whole of our fleet and its aviation.

The war has dragged on in Europe beyond the time which was necessary because we relied too much on our land-based aviation to defeat the enemy. We failed, as a consequence, to develop a large enough ground force so that, once we did invade the continent, after waiting long beyond the time when it would have been most effective, we were unable to put a quick end to Germany despite the tremendous Russian military power successfully exerted against her in the east.

Why should we repeat this error in the Orient? Why should we drag the war on longer than necessary—costing us $250,000,000 a day according to the President, and with a constantly mounting list of killed and wounded? Japan is our objective. Let us strike at its heart with the might of our combined forces. END

Report from Washington

(*Continued from page* 53)

on the instrument panel of planes which would give constant visual indications of other planes in the neighborhood.

Airport Mirage

There can't be two airports where one exists, but navigators returning to England or Italy from raids deep into southern Germany have thought they've seen them while flying over Lake Geneva on the Swiss border. The maps clearly indicate an airport at one end. And, sure enough, there it is. But then they look again and see another airport.

They refer to pilotage maps, locate it exactly by the shoreline. There is a cove, they say, and they look to find it in real life below. They find it not once but twice, near each airport. They carefully pick out distinctively-shaped forests, streams, mountains. In every respect the landmarks are duplicated at each airport as if they were reflected by a mirror.

To a man passing over it is something to report to intelligence. To a crew whose plane is badly shot up and must drop down to land in neutral territory, it is a life-and-death matter. For one of the airports is Swiss and safe; the other, a carefully-devised facsimile, is German.

NACA at Work

John V. Victory, secretary of the National Advisory Committee for Aeronautics, in a recent speech, revealed what speeds the *Mustang* and *Shooting Star* could fly at, as far as their aerodynamic design is concerned. For instance, when the *Mustang* began to get more powerful engines, the increase in speed caused unlooked-for trouble in serious rumbling and strong vibrations in the radiator scoop. Investigating the causes, NACA used models in a 600-m.p.h. wind tunnel. Similarly, the *Shooting Star* model was tested in a wind tunnel at "over 500 m.p.h." and the first flight tests with the plane, Victory said, were at speeds faster than any human being ever flew before.

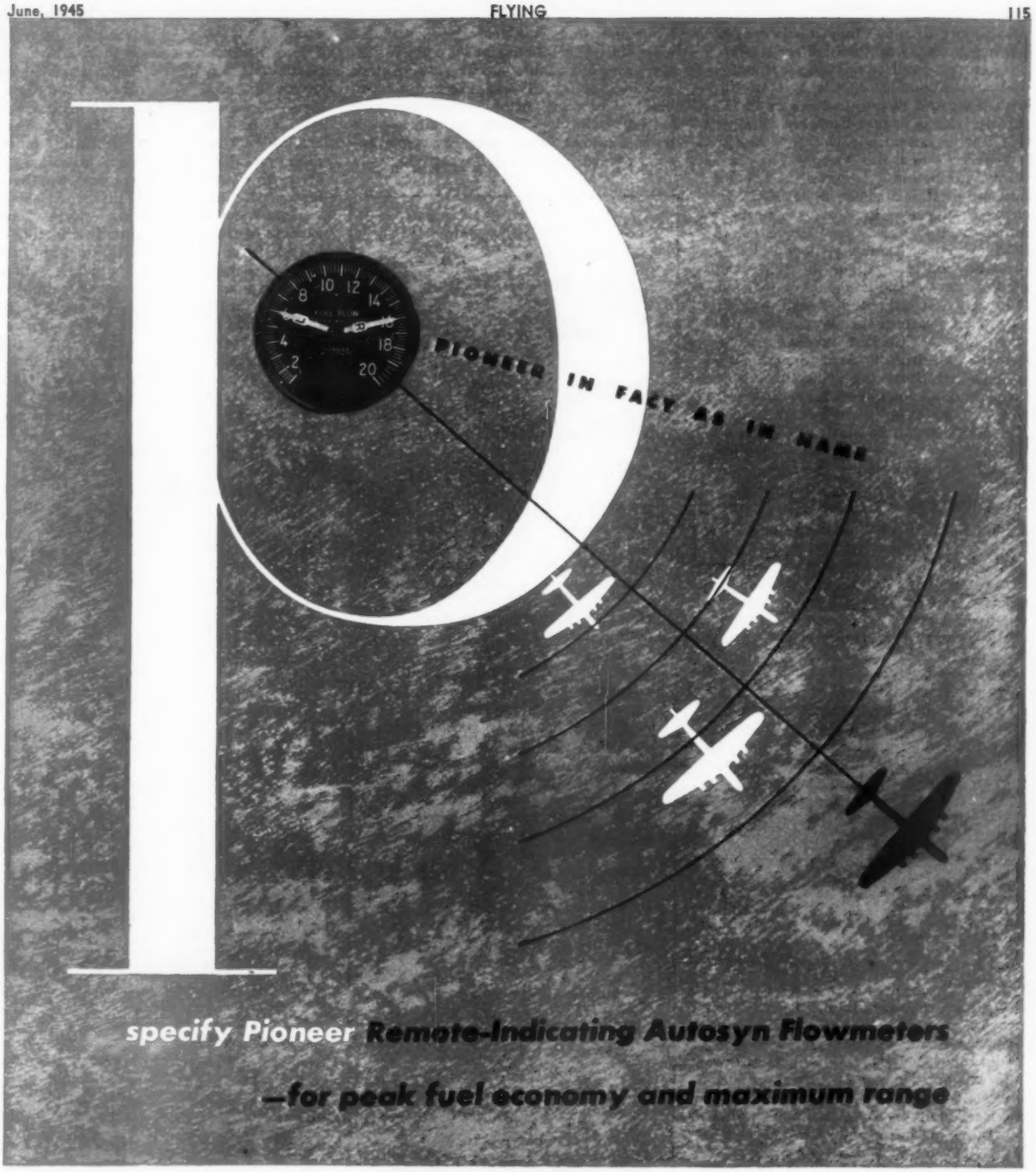
Still Socking

A lumbering old biplane which might reach its designed top speed of 165 m.p.h. with the aid of a little "body English" by its crew and a strong, steady tailwind is still being used by the Navy for scout observation work in the Pacific theater. It is the SOC, affectionately known as the "Old Sock" among Navy flyers . . . Vintage 1936, it was obsolete before the war. The only scout observation plane available, it was pressed into service. Operating from cruisers in the Mediterranean, SOC's did spotting, rescue work and patrolling. One sank an Italian submarine and another, flying at tree-top level,

For your postwar personal airplane reliable instruments by **Autoflight** will simplify your problems of global navigation. Today, precision-built Autoflight Direction Indicators (Model 2221 illustrated) are obtainable for most private planes and airliners. **Autoflight** builds the smallest in size and the lightest in weight Direction Indicaters manufactured anywhere.

Autoflight shows the way, having designed and produced "perceptible at a glimpse" aircraft instruments. Write for Catalog A-45 giving complete data. Address — G. M. Giannini & Co., Inc., 161 E. California Street, Pasadena 5, Calif. U. S. A.

AUTOFLIGHT


PIONEER IN FACT AS IN NAME
specify Pioneer Remote-Indicating Autosyn Flowmeters
—for peak fuel economy and maximum range

The Pioneer Autosyn Flowmeter is a remote-indicating instrument of high accuracy and dependability, providing precise indication of the rate of fuel consumption over the entire range. It enables the operator to hold the engines to predetermined consumption rates for optimum power plant efficiency, and adds to flight security by accurately foretelling flight range. Tests at altitudes up to 35,000 feet, and over extreme temperature ranges, show no appreciable errors in indication. Advanced design holds pressure drop extremely low—less than 1 psi drop over the entire operating range. (Complete specifications and data may be obtained by writing to the address below.)

PIONEER INSTRUMENTS

Bendix, Pioneer, and Autosyn are trade-marks of Bendix Aviation Corporation

ECLIPSE-PIONEER DIVISION Bendix AVIATION CORPORATION

Teterboro, N. J.

drove more than 100 Italian soldiers onto a beach in Sicily and held them cornered until our ground troops arrived to take over . . . About 20 SOC's are on duty with light and heavy cruisers in the Pacific . . . It is not surprising that all SOC's were not withdrawn after the Curtiss *Seagull* and the Vought *Kingfisher* went into action. Despite its age and lack of speed and range, the SOC is considered superior in some respects to either of its successors. However, the SC-1 (Curtiss *Seahawk*), now in action, probably will put all of the SOC's and a good many of the *Kingfishers* out of the fight . . . SOC's lack of speed—cruising 133 m.p.h., stalling 57—was a big asset when it was stacked up against fast, fighter-type aircraft. Armament includes a .30-caliber Browning firing through the prop, and a .30-caliber Browning on a flexible mounting in the rear cockpit. The forward gun carries 500 rounds and the rear gun 600 rounds. Racks for light bombs are fitted under the lower wing.

Speculations

Next time you're tempted to write asking us why our aircraft specifications are so blankety-blank wrong, remember that sometimes the best we can do through official channels is get a set of speculations . . . Latest example of what we mean is the recent release of data on the Consolidated RY-3, cargo version of the Navy's *Privateer* (PB4Y-2). RY-3 is a Navy designation, but Navy said they had no data because they're not ordering. The British were ordering—why not ask them? . . . We queried the British Air Commission and they obliged. Then, just the other day, Consolidated Vultee released data on the same plane to us. Here's the box score:

	British	Consolidated
Wing span	110 feet	110 feet
Length	75 ft. 5⅜ in.	75 feet
Height	29 feet	29 feet
Gross weight	56,000 lbs.	60,000 lbs.
Passengers	Restricted	28
Maximum speed	260 m.p.h.	250 m.p.h.
Range	Restricted	Over 3,000 miles
Horsepower each engine	1,200	1,350

Weather

With everybody talking about the improvement of weather predictions since the war began, we decided to check into it the other day to see how accurate the talk was and what the post-war promises are . . . The biggest wartime weather job has been done by AAF, although numerous other organizations have been active. Navy has specialized in the Pacific, the U. S. Weather Bureau activities have blanketed continental U. S., and the Signal Corps has made major contributions, especially in solving equipment problems . . . AAF maintains several major research centers and more than 1,000 observation and forecasting stations scattered all over the map. Weather reports—even in a critical war area—are handled on a spot-news basis. For instance, at H-hour-plus 24 weather was being radioed from French beachheads to AAF's weather headquarters in the Pentagon here in Washington, where some 250 experts run a world weather service . . . Navy has even more observation posts—1,400—including 14 major bureaus. They, too, rush a weather man back of the beachhead Marines when moving in on a Pacific island . . . Invaluable in these super-rush weather activities are three types of mobile or transportable meteorological stations. One is a mobile set and two are packaged for transportation by any available means. The mobile set played a major role in the invasion of France. This unit includes meteorological equipment for both surface observations and for "pibal"—pilot balloon—work.

Rear-View Mirrors

REAR-VISION mirrors for fighter pilots must withstand extremes of heat and cold, plus rough usage. After many tests, the AAF Materiel Command has selected chromium as the best all-around material. One type of mirror is shown above mounted in a *Mustang* fighter plane. Possessing less reflectivity than gold, silver, nickel or lead sulfide, chromium-backed glass mirrors are the only ones to meet AAF specifications. They must withstand a temperature variation from —65° to plus 165° and remain unshattered from nearby hits. A heavy adhesive sheet across the back of the mirror prevents glass from shattering in case of a direct hit. Below, three of the curved mirrors are shown mounted around the inside of a Navy *Corsair's* hatch. Cost of the mirrors varies from $3 to $8. The 2¾ x 5½-inch curved mirror has a demagnification standard of 2.5 to one.

"Making" Weather

Army and Navy weather forecasters have done pretty well. Faced with "bad" weather at the time of the invasion of France, they nevertheless picked the best possible D-Day in the limited period of time within which, for other military reasons, they could work. In the Pacific a few weeks ago, Admiral Halsey's fleet astounded the Japs by attacking under their noses but when they started to go after him they found another weather-man prediction declaring dividends—Halsey got away in a zero-zero storm. The reverse of this proved equally effective—a task force came in for attack in the wake of a typhoon from which the Japs had not had time to recover. Smoke-screens, threatened with ineffectiveness if the wind isn't just right, are never considered without first consulting the weather man. Weather men will admit to this: 48-hour forecasts are today from 60 to 90 percent accurate, while 10-day forecasts are 60 to 75 percent correct. Percentages will increase on the side of accuracy as time goes by. . . .

My, How You've Grown

Statistically-minded devotees of the U. S. Navy will be interested in these facts: In 1941 there were 5,260 U. S. naval planes . . . today there are 37,000. In 1941 there were 6,300 naval pilots . . . today there are 47,276. In 1941 there were 24,000 officers and men throughout the naval air service . . . today there are 299,968.

Comparison of Japanese and U. S. aircraft losses:

	Jap	U.S.	Ratio
1942	1,134	384	3.0-1
1943	2,212	351	6.3-1
1944	6,473	1,147	5.7-1
Totals	9,819	1,882	5.2-1

Briefings

RFC is hoping to straighten out its surplus-plane-advertising problem and its troubles with the aviation industry generally by signing on Floyd B. Brinkley of the Information and Statistics Service, Civil Aeronautics Administration. Brinkley has been with CAA or its equivalent in a Government aviation agency since one was organized in 1927 . . . The XP-56, built by Northrop, although not going into production, is the first all-magnesium, all-welded plane to be built in this country, and as such has tremendous potentials as a trial job for future developments along these lines. Toughest question now bothering engineers: can magnesium be protected adequately against corrosion?

Another Northrop development which may have post-war possibilities is a wing-type glider, in which the pilot lies prone. Rudder pedals are placed conveniently for operation by the pilot's feet . . . Despite bad weather, Curtiss-Wright's huge Navy warplane plant at Columbus, O., recently shattered all flight test records when 107 planes were flown out during one five-day period. Most of the planes were *Helldivers* . . .

To reports that the designers of the Hughes flying boat were in the same position as the man who built a yacht in his cellar and then had to tear the house down to get it out, our Los Angeles correspondent replies that Hughes Aircraft has leased eight acres of ocean frontage

Two summers ago he was chasin' down cattle on a Texas ranch.

Now, in a truck he calls "Busy Lizzie," he hauls high-octane aviation gasoline round a jungle airfield. He's a key-man who knows every plane, pilot and crew-chief on the field.

All through the day and into the night he and his truck make their rounds, gassing up. And last thing, in the blackout of a jungle night, you can see the sparks his tail chain makes, dangling from the back of the truck, as it rattles across the steel-matted runway — still on the job.

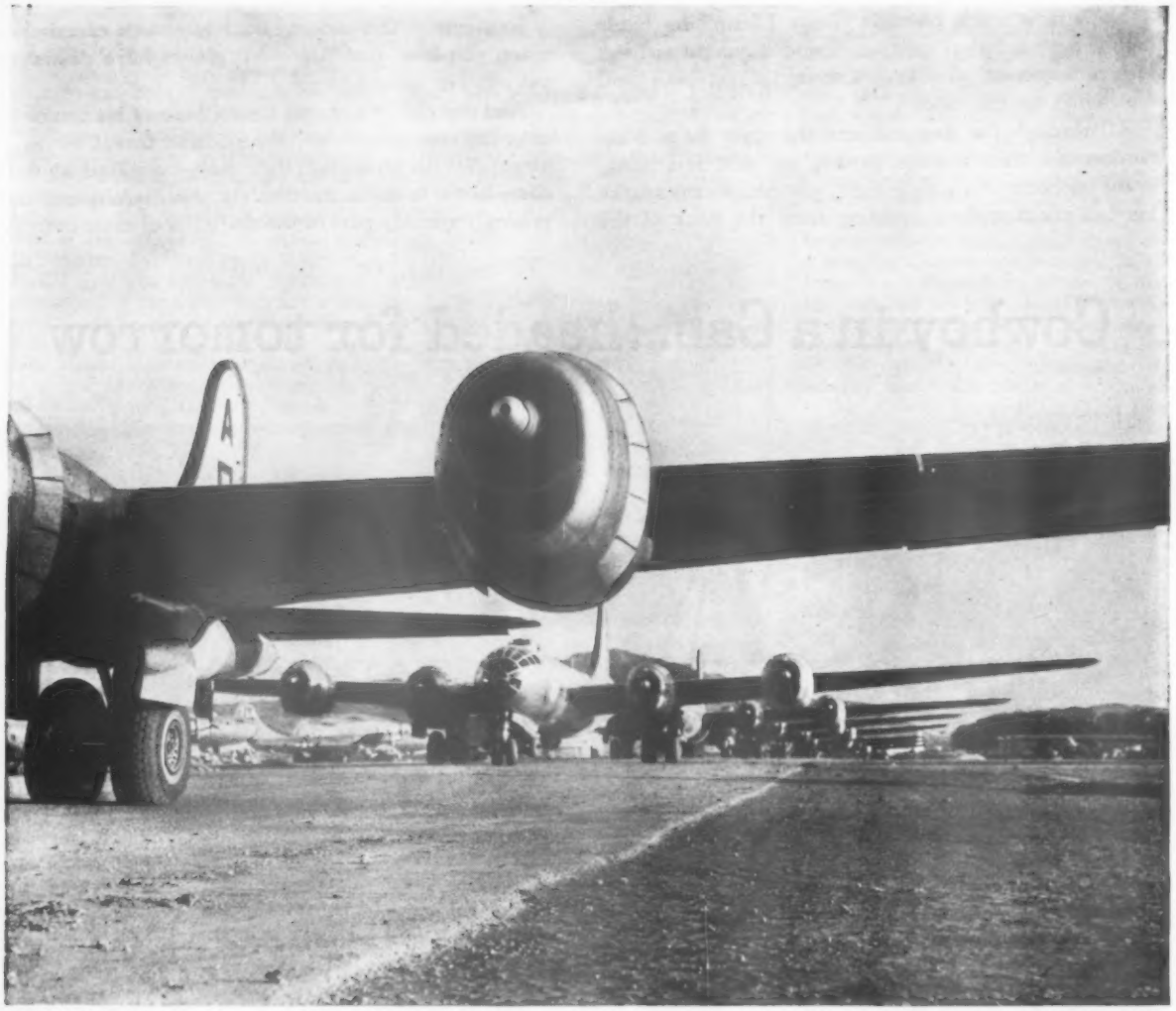
Remember this cowboy and his truck of gasoline when you hear that American planes have destroyed yet another enemy target.

And remember him and the millions of his comrades *after* the war — men who have made *air travel, air cargo, air express* the business of their daily lives. And who will come home to make them safely, wonderfully and *surprisingly quickly* part of the daily life of their country.

Cowboy in a Cab...headed for tomorrow

IT'S A GOOD BET *that the high-octane gasoline hauled by "Busy Lizzie" and her cowboy comes from the Esso refineries. Because every fourth combat plane in the Air Forces of the United States and Great Britain flies on gasoline from our refineries.*

With more than 40 years' practical experience in the manufacture of aviation petroleum products, together with a fund of new war-won knowledge and magnificent test-block and laboratory facilities, we will put extra power behind our promise that "You can depend on Esso Aviation Products."



Official Photo—U. S. A. A. F.

Finish the Fight—with War Bonds

. . . and more to come

With engines warmed up for the take-off, Boeing B-29 Superfortresses fill the long runway on Saipan . . . one behind another, as far as the eye can see. Across the field, as on other fields in the Marianas, still more wait to wheel into line. Tomorrow you will read in your paper: "Industrial targets in Tokyo have been hit again by a force of over 300 B-29 bombers."

It was less than a year ago that the first attack on Japan by the giant Superforts thrilled the nation. Today their valiant crews are regular commuters on the more than 3000-mile round trip. In waves of sky-filling formations, they carry destruction to the enemy's workshops on a relentless schedule.

Back of this achievement is another story—an epic of production. To design, build, test and manufacture in quantity an airplane that so far exceeded all previous bombers in bomb-load, speed and range — and do it *in time* — was an unprecedented task. It called for pioneer work in engineering, tooling and planning. New facilities and processes had to be started from scratch. Methods had to be devised for putting the vast manufacturing program into effect, not only in Boeing's own plants but in those of other aircraft companies, chosen by the Air Technical Service Command of the Army Air Forces to help increase quantity production of the big planes.

Impossible as the job looked, Boeing men were equal to it. Superfortresses are rolling off the production lines in steadily mounting numbers. In the hands of hard-hitting American airmen, they are vital weapons in the war against Japan, and there are more . . . many more to come.

Tomorrow Boeing research, design, engineering and manufacture will be applied to peacetime aircraft for your use . . . your assurance that any such product "Built by Boeing" will be built to lead.

DESIGNERS OF THE B-29 SUPERFORTRESS • THE FLYING FORTRESS • THE NEW STRATOCRUISER
THE KAYDET TRAINER • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

off Long Beach, Calif., approximately 25 miles from the Hughes plant. The whole project will probably cost about a million dollars but the route hasn't been definitely decided as yet. . . . Army Air Forces is ordering Republic *Seabees* for air ambulance work and the Coast Guard may follow suit. The AAF version will be slightly modified. While landing gear will retract, it will not recess into the fuselage, leaving more room inside for passengers. The change will make it a roomy four-placer instead of a tight one. Area of the tail assembly has been enlarged somewhat to provide better directional stability, and part of the nose will swing out on hinges to permit loading of stretcher cases . . .

Language notes: We're told that in Russia they call a putt-putt a "primus" because it makes a noise like the stove and the beautiful Spanish name for the *Flying Fortress* is *La Fortaleza Volante*. . . . Mice in the immaculate AAF quarters at the Pentagon recently got into a major's drawers and ate his war record plus two copies of FLYING . . . Sharks are sent packing in the Pacific by a black cake of chemicals which a pilot can dissolve in infested salt water if forced down. The man-eaters just don't like the smell of the stuff. END

London Letter

(*Continued from page* 58)

nautical research worker No. 1. He is B. N. Wallis.

Wallis invented the geodetic system of construction (used in the *Wellington* bomber); the dam-busting device used against the Möhne and Eder dams; the 12,000-pound armor-piercing bomb which sank the *Tirpitz*. Aircraft of Wallis' geodetic design (Vickers *Wellesleys*) still hold the official world's distance record which they set in November, 1938, with 7,160 miles non-stop.

Rarely seen in public, hardly ever photographed, and described by one of his friends as a "non-convivial introvert", Wallis is certainly one of the greatest original thinkers in world aviation.

The Circle of Aviation Writers holds its luncheons in private and if guests choose to speak at them their words are regarded as strictly confidential. The Circle is much smaller than the comparable body in the United States. Its president is Maj. C. C. Turner who started work in aviation well before World War I.

More About Jets

First official release of the news that the de Havilland engine company is making a jet unit came in an Air Ministry bulletin of February 28. It was indicated here that the units for the Lockheed *Shooting Star* (P-80A) are based upon a de Havilland unit model.

In the same bulletin it was stated that the RAF's Gloster *Meteor* fighter has jet units by Rolls-Royce. Both the de Havilland and the Rolls-Royce units are developed from the ideas of Air Commodore Frank Whittle, which means that they are both gas turbines.

Meanwhile another new German jet fighter had made its appearance on the

ANCIENT PIPE OF
FRANCE
Today you see the
LHS
STERNCREST
STERLING
in FRANCE, and everywhere
Strutting along the Rue de Rivoli, right now, is an American G.I. puffing away on his LHS—and many others are doing likewise, the world over. That's why LHS's are limited in supply.
War over, we couldn't produce a better pipe than the Sterncrest of today. It's prewar from its briar bowl to its hard rubber bit. After the war, more models to choose from but no finer pipes.
$5
This is No. 46
Plain Finish
Also in Antique finish. Dozens of other models
Other LHS Pipes:
$10 — LHS Sterncrest Ultrafine
$7.50 — LHS Sterncrest 14K
$3.50 — LHS Certified Purex
IMPORTED BRIAR
Supplies limited —you may have to wait for some models, but it's worth it!
AT YOUR DEALERS
"FOR SOLID COMFORT"
LHS
PIPES
Write for "Pointers on Pipes"—FREE
L&H Stern, Inc.
Stern Building, 56 Pearl Street, Brooklyn 1, N.Y.

western front, the Arado Ar-234. Until we know just what the Germans have been doing with jets it is unprofitable to make claims for priority of invention. The Junkers unit, used in the Messerschmitt Me-262, looks almost as if it had been developed in parallel with some of the British units.

German jet aircraft have been expected by Londoners to try hit-and-run bomb raids; but none has so far materialized. When the Germans made their first attack on England with piloted aircraft since June, 1944—on March 3, 1945—they sent 70 machines; but none was jet-driven, most were Junkers *Ju-188's*.

Money for Air

Members of Parliament heard a stirring account of the work of the RAF on March 6 when Sir Archibald Sinclair presented the token air estimates. In peacetime all details of expenditure are given; now the minister makes only a general statement.

Among the things disclosed were that a new British bombsight of "extraordinary accuracy" was used for sinking the *Tirpitz*; that young Women's Auxiliary Air Force officers had been dropped by parachute in occupied France by night to help the French underground movement when the Germans were in occupation; that, had it not been for Allied bombing, German fighter production might have been 3,000 a month by the end of last year; that the V-2 rocket weapon requires a space only 23 feet square for launching, and that bomber losses had declined from 4.1 per cent of the aircraft dispatched in 1942 to 1.1 per cent in the first two months of 1945. END

Jet Lightplanes?

(*Continued from page* 31)

San Francisco or from New York to Montreal in two hours—when deer hunters need not worry about getting out of a small field in the High Sierras, knowing they will have as much power available there as at sea level. That's the sort of performance jet propulsion promises. Even at temperatures below zero the jet plane pilot need have no fear of engine failure—tests have been made at from 50° below zero up to 150° above with no appreciable difference in starting time required.

And in addition to the advantages, there is the pleasure to be enjoyed in flying a jet-propelled plane. On your first flight you will hardly believe your senses because this new plane will be so different. You will feel as though you are piloting a fast glider, gently but rapidly being pushed through the air. You will notice the absence of torque, how unnecessary it is to make trim changes for different speed settings. Upon landing, you'll feel as fresh as you did before taking off.

The total lack of vibration and noise in jet-propelled flight is astounding. The author has spent 15 years flying virtually every type of airplane built, but has never experienced anything else which even remotely approaches it. Gone is the roar and pounding that causes fatigue. Conversation can be carried on without shouting. Then, too, there is perfect vision ahead. Windshields can be molded like bubble canopies with no interfering frame work.

Because the jet engine is located well back in the fuselage, it is possible to place passengers much farther forward than in conventional planes. This will greatly enhance the pilot's view of other planes—not a small safety factor when the sky is full of planes, as it probably will be after the war.

The hazard of fire in the jet lightplane will be practically eliminated. Kerosene will not explode—even to set it on fire is difficult. It is this fear of coming down in flames that has kept many from flying.

To obtain the higher speeds and longer ranges already within reach through jet propulsion, conventionally powered lightplanes must employ controllable pitch propellers, manifold pressure gauges, mixture controls, carburetor heaters, superchargers, etc.—additional equipment which will materially increase the complexity of the pilot's cockpit and definitely limit those who will be able to co-ordinate satisfactorily for flying.

In a jet plane, the throttle can remain wide open for indefinite periods without damage to the engine. The usual oil temperature and pressure gauges are still on the instrument panel as well as fuel pressure and quantity indicators. In addition, there are instruments to inform the pilot of the temperature in the jet tail pipe and r.p.m.'s of the turbine-compressor. Simplicity is the most noteworthy feature of the jet engine. "Gadgets" have been the bane of the modern conventional type plane. Instead of striving for greater simplicity and less dependance on the human element, the trend in plane design has been to add more instruments and controls until piloting has become a science in which few become proficient.

No airplane now powered with a gasoline engine can accommodate a jet engine. But only a bit of imagination is required to design a jet-propelled lightplane. The airplane closest to that design of any in use today (in my personal opinion) is the Ercoupe. In addition, the control system and the stall and spin-proof characteristics of that plane make a strong selling appeal to the average customer. To make lightplanes universally popular, it will be necessary to provide similar safety and simplicity features.

The Ercoupe, empty of fuel and oil, weighs 725 pounds. Of this total, about 350 pounds is contained in the engine and propeller. A jet engine of greater horsepower, or thrust, will weigh approximately half as much, or 175 pounds. It's true that at present the jet uses about twice as much fuel at low altitudes as do conventional aircraft engines. But the 175 pounds saved in engine weight can be turned into 26.5 gallons of fuel at 6.6 pounds per gallon. The jet-powered plane will have the same time in the air as a gasoline powered cr..ft, but its speed will be at least 100 m.p.h. faster.

It is only at low altitudes, however, that jet plane fuel consumption is excessive. Doubling the fuel consumption while doubling the speed is not expensive. But as altitude is gained in the jet plane the rate of its fuel consumption decreases until, above a certain altitude, it actually uses less fuel than a gasoline engine. Moreover, changes in engine design, already effected during the short time jet planes have been flown, have substantially reduced the rate of fuel consumption. And other modifications now contemplated—modifications which can't

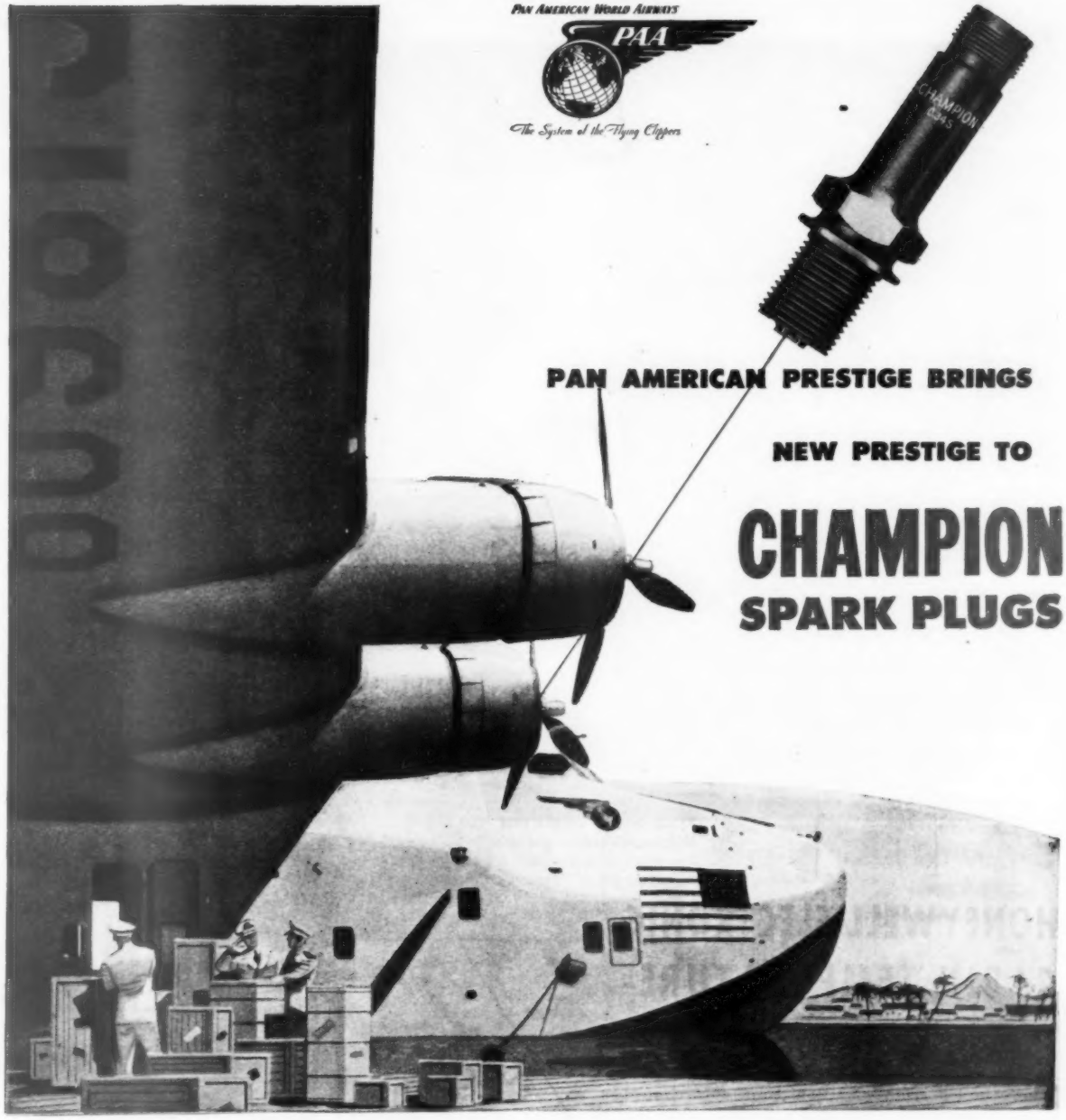
FLYING

"Maybe ve should joost sound der siren ven dere iss no raid."

PAN AMERICAN WORLD AIRWAYS

PAA

The System of the Flying Clippers



PAN AMERICAN PRESTIGE BRINGS

NEW PRESTIGE TO

CHAMPION SPARK PLUGS

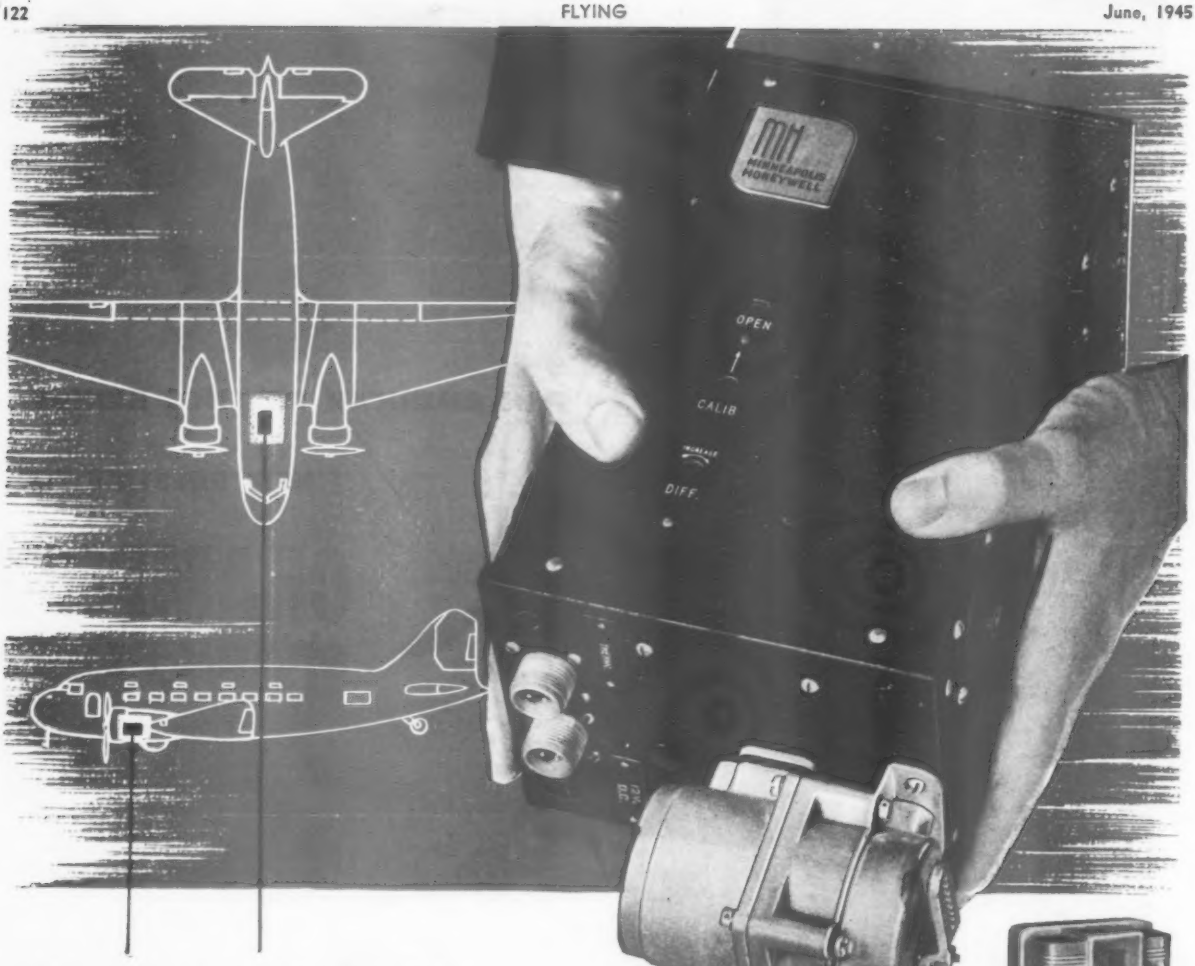
In its far-flung operations to the outposts of the world, Pan American Airways has been operating under stringent wartime restrictions and equipment limitations. It has nevertheless compiled an outstanding performance record in both contract work for the Army and Navy and in maintenance of its own commercial routes.

This achievement bespeaks a painstakingly scientific maintenance and service program. The small but vital spark plug naturally came in for close study because of its direct bearing on engine economy, performance, and dependability. Out of these studies and records emerged conclusive and dramatic evidence of superior performance, longer life, lower costs, lower maintenance and servicing time with Champion Ceramic Aircraft Spark Plugs.

The Champion Spark Plugs for every aircraft engine are blood brothers to those used in Pan American's far-flying clippers. They are products of the same research and engineering, exclusive materials and processes; and, as a result, they bring an extra measure of performance and dependability to every engine. Champion Spark Plug Company, Toledo 1, Ohio.

C26 Unshielded

USE CHAMPIONS AND FLY WITH CONFIDENCE



HONEYWELL ELECTRONIC CABIN TEMPERATURE-CONTROL PACKAGE . . .

for DC3's

This complete electronic cabin temperature control package is specially designed for existing DC-3's. Weighing less than eight pounds, it is quickly and easily installed and easily removable for routine inspection. Fully modulating and non-hunting, this new system meters heat in direct proportion to cabin heat losses. Designed for tomorrow's aircraft, this new electronic temperature control package is available for DC-3's today. It will also be available for other transports in the near future. Write Aero Division, Minneapolis-Honeywell Regulator Company, 2948 Fourth Ave. South, Minneapolis 8, Minnesota, for full details.

Look at these outstanding Features . . . .

1. Complete package unit.
2. Weighs less than 8 pounds.
3. Easily and quickly installed.
4. Easily and quickly removable for routine inspections.
5. Fully modulating and non-hunting.
6. Meters heat in direct proportion to cabin heat loss.
7. Anticipates outside temperature, solar radiation and radiation to space.
8. Available for all standard AC or DC aircraft power.

MINNEAPOLIS Honeywell CONTROL SYSTEMS

CREATIVE ENGINEERS • Makers of the famous M-H Electronic Autopilot, used on AAF four-engined bombers

be discussed for security reasons—give promise that, by the time jet engines can be released for public uses, then fuel consumption will be no serious problem.

As mentioned before, an increase in speed of a jet plane also increases its power, due largely to the ram effect of the intake scoop. In other words, the jet engine depends on air—and lots of it—for its power. The more air that can be rammed into the combustion chambers at low altitudes, the more efficient power will be developed and the less fuel used. As altitude is gained, the back pressure on the jet exhaust becomes less, allowing it to pick up speed.

In our hypothetical plane, we will put the pilot and his passenger side-by-side well forward in the nose, ahead of the leading edge of the wing. There he will have the visibility he needs so definitely in the coming age of crowded skies. We will place the jet engine behind a soundproof wall to the rear, the tail pipe coming out of the tail cone of the fuselage. The fuel tank in this way can be situated between the engine and the passengers directly over the center of gravity. Ultimately the cabin can be supercharged for high altitude flying simply by tapping the compressor end of the jet engine the same way the turbine end can be tapped for heat.

It will not be necessary to provide a carburetor heater as the fuel is injected at high pressure. The intake scoop won't ice up because there is no pressure drop that causes freezing but instead a pressure increase as the air is rammed into the scoop opening.

Another saving in weight and increased simplicity of design will be derived from the shorter, and therefore lighter, landing gear. To step into the cockpit need be no more difficult than climbing into the family auto. The lack of a propeller will eliminate the serious hazard of walking into the whirling blades.

All these features of safety and convenience will enhance the utility of the plane. With the greatly decreased expense of manufacturing a jet engine with its few moving parts, the other bugaboo of private flying—excessive cost — will have been largely done away with.

Taxiing a jet plane is accomplished much as with any other plane, except that the pilot notices the lack of propeller blast on the rudder. At low speeds the rudder is practically useless and brakes must be used. But if the nose wheel is steered by the control wheel, the brakes can be arranged as in a car—braking simultaneously. And the nearer we can make flying seem like driving, the more people will be able to participate in both. It is the average man on the street who hasn't time to learn the intricacies of present-day flying who must be sold on flying if aviation is to expand after V-Day.

He should be told that the cost of operating a jet-powered lightplane will be far less than it is today. In the first place, a turbine is difficult to wear out, as there are no rubbing parts. There is no propeller to become dented or out of balance. Spark plugs, valves, timing gears, etc., are gone. The starter, generator and fuel pump are about the same as used on a gasoline engine, but little repair is necessary for these items.

In any event, the future of lightplanes will be closely connected with the development of jet propulsion. Only through use of this medium can we think of a trip to Mexico City or Panama on a week-end. Only with the flying utility it promises can we hope to make the transition from "a nation on wheels" to "a nation on wings!" END

CRASH ON A CARRIER

WAVED off on the initial approach, Ens. Byron Johnson, piloting this Grumman *Hellcat*, banked sharply and "poured on the coal" to go around (above, left). His tailhook, however, snagged a wire which dragged the plane to the deck and veered it toward the catwalk (above, right).

The abrupt nose-up ruptured the belly-tank which burst into flame. Quick-witted Lieut. Walter Chewning, Jr., who watched the accident from the cat-walk, leaped onto the wing of the flaming fighter (right), and aided the pilot to safety. Neither was injured, but the plane was given the "deep-six"—pushed overboard.

"It's the little things you look forward to!"

That first weekend at the beach — the salty sting of the still cold ocean and the wonderful heat of the white sand after your swim!

Then, the out-door supper—you'll be wearing slacks and a pair of extra comfortable, extra smart, loafers like the W. L. Douglas "Vagabonds!"

$6.50 to $8.50
Other styles $5.50
Denver West Slightly Higher

W. L. Douglas
W. L. DOUGLAS SHOE CO.

Shoes
BROCKTON 15, MASS.

Stores in Principal Cities
Good Dealers Everywhere

INVEST IN VICTORY — BUY BONDS

The Negro in the AAF

(*Continued from page 24*)

visual signals, book learning); 10 weeks of primary flying in which the fledgling airmen get some acrobatics and flying by instruments; 10 weeks of basic flying in a Vultee *Valiant;* 10 weeks of advanced flying in twin-engined Beech *Wichitas,* and, finally, 10 weeks of *Mitchell* transition.

The 477th's flyers will graduate with the same standards of proficiency as any other group of pilots. There are no different standards set up for them. They can't take any longer at the course. They receive the same training, acrobatics and precision flying. When a man graduates he is just as good as any other man. If an individual doesn't measure up, he doesn't get through.

The aircrew classification tests, which are the psychological part of the complete examination for flying, are the screening mechanism employed by the Army to select the cream of the country's manpower for its flying assignments. It has been described as "the backbone of the pilot program." At the various classification centers, the nation's would-be military pilots undergo the examinations to determine their aptitude for flying.

It is at this point that the big "wash out" occurs; everyone has to measure up to certain minimum standards of proficiency in the tests or the Army doesn't waste time or money training the individual as a bombardier, navigator or pilot. The Air Crew Classification tests rate the applicant in all three categories and the field in which he shows greatest aptitude generally becomes his AAF assignment.

Required tests are (1) the final-type physical examination for commissioned officers, (2) the aviation cadet qualifying examination, (3) the "54" physical examination for flying, and (4) the aircrew classification tests. Next comes the exacting training routine of Tuskegee.

There are "wash-outs" at Tuskegee just as there are at Randolph and Kelly fields. The percentage doesn't vary too widely among the various schools. Again it is an individual proposition. The air candidates at Tuskegee, Randolph or Kelly Fields are put through the same training, required to meet the same high standards.

Colonel Parrish declares: "These kids are like anybody else. Some are daring; some are conservative. There is no generalization which would be true of all. Some of the boys are mighty good; some are weak. It is like any other outfit."

On the battlefront in Europe, the Negro flyers have adequately demonstrated their capabilities—dive-bombing with the British 8th Army in Italy; flying escort missions to the Ploesti oil fields of Rumania and in the invasion of southern France; hitting enemy radar installations, gun positions and attacking ground forces.

A "special mission" called for the repatriation by air of hundreds of American pilots forced down in enemy territory. Flying escort for the huge transport planes on this particular job was Lieut. Lawrence "Bernie" Jefferson, former all-American football star at Northwestern University, but now a member of the 332nd Fighter Group.

On arrival at the rendezvous, the prearranged signal was not forthcoming. Lieutenant Jefferson and his flight of *Mustangs* peeled off for a "grass-cutting buzz" of the vicinity. On the first sweep nothing happened. On the second, the hundreds of evacuees emerged from their place of concealment to cheer and wave in the rescuing transports.

"Nothing has ever been so vivid in my memory as the sight of those American pilots jubilantly cheering us on," said the 26-year-old pilot who once received the public's acclaim on a football gridiron in Evanston, Ill.

It was the 99th Fighter Squadron which blazed the trail and established the qualifications of Negro pilots for aerial combat. The 99th went overseas early in the war and it went over without leaders experienced in operations. For a time, it was tough going. As the 99th's leaders developed, however, it began to fight well and distinguished itself at Anzio. Then the 332nd Fighter Group was activated; the 99th became part of an all-Negro unit and its record of combat excellence continued to improve.

When the 99th disembarked at Casablanca in April, 1943, however, none recognized more clearly that its commanding officer, Colonel Davis, the role to be filled by the squadron.

"Just what a Negro pilot in a *Warhawk* would do when antiaircraft fire burst about his ship or when an enemy aircraft was strewing cannon shells and machine gun bullets about his cockpit was a matter that was really conjecture in the minds of some of the high-ranking officers in the AAF," Davis explained.

"The 99th Fighter squadron, therefore, was an experiment to determine whether the Negro pilot was physically, mentally and emotionally suited to the rigors of combat flying.

"It is a very significant fact, I believe, that all members of this organization were impressed at all times with the knowledge that the future of Negroes in the Air Forces probably would be dependent largely upon the manner in which they carried out their mission. Hence, the importance of the work done by this squadron, the responsibility carried by every man be he ground crewman or pilot, meant that very little pleasure was to be had by anyone until the experiment was deemed an unqualified success."

The "experiment" began when the 99th, specially recruited from Negro colleges all over the United States, was activated at Chanute Field, Rantoul, Ill., on March 22, 1941. In August of that year the squadron moved to Tuskegee for training. It did its operational training in *Warhawks.* Two years after its creation, the squadron set sail for Africa.

Shortly after its arrival in Casablanca,

. . . For Men who Really Know Pipes
Royalton
CROWN
ONE REMARKABLE ADVANTAGE OF THIS PIPE
is its ability to stay everlastingly dry after long and constant use. No other pipe offers all the Royalton Crown safeguards—the condensing well and patented features that trap bitter slugs and juices...assuring an ever-cool, ever-dry bowl and mouthpiece. An extraordinary pipe that provides extra dividends of smoking contentment.
MOUTHPIECE TUBE prevents backflow of moisture
CONDENSING CHAMBER traps and holds bitter juices and sediment
BOWL GUARD keeps shank and bowl dry
REMOVABLE SECTION eases thorough cleaning
CHAMBER GUARD bars tobacco fragments from bit
Patented
$1.50 Selected Briar
If your dealer is short of Royaltons remember that many of these pipes are going to servicemen.
HENRY LEONARD & THOMAS, INC. • OZONE PARK, N.Y.

Then, considering the large quantity, early delivery and precision required, we all agree . . . It's a job for Aeronautical Products » »

WHERE ordinary thinking stops, Aeronautical Products' engineers begin. Where normal precision techniques leave off, Aeronautical Products' exceptional machining methods take over. It's only natural, then, that our mammoth capacity, engineering genius and creative skill developed long before the war and now devoted to total war output, will give us continued Leadership in the peacetime production of precision parts for every purpose. . . . Here in one organization with two great plants, is the *complete* precision parts picture . . . from creative engineering through all phases of manufacturing. So if you, too, are looking ahead, now would be a good time to solve your peacetime parts problem. Our Executive Sales Office will gladly mail you interesting facts on our plant facilities and equipment. Chances are, we have the answer you're searching for!

★ BUY WAR BONDS ★

● *Make ownership of a safe, sturdy Aeronautical Products Helicopter a "must" in your personal postwar plan. You'll find you can afford one!*

AERONAUTICAL PRODUCTS, Inc.

DETROIT PLANT
and Administrative Offices:
18100 Ryan Road, Detroit 12

OHIO PLANT:
Washington Court House
Ohio

ENGINEERING OPPORTUNITIES

When peacetime comes will you still

EARN BIG MONEY?

Your opportunity to maintain and increase your peacetime Earning Capacity is NOW! Be prepared for increased competition and for the golden age of aviation and engineering which the world faces. Write for our free 176-page copy of Engineering Opportunities outlining the British home study courses listed below. There is no obligation. Write today to Canadian Institute of Science and Technology, Limited, 312 Chester Building, 219 Bay Street, Toronto 1, Ontario.

- A.F.R.Ae.S. Examination
- Air Ministry Exams for Ground Engineers
- Advanced Aeronautical Engineering and Aeroplane Design
- General Aeronautical Engineering
- Aero Engine Course
- Aircraft Apprentices' Course
- Pilots' "B" License
- Air Navigators' Certificates
- Matriculation (London)
- B.Sc. (London) Pure Science

ALSO COURSES IN OTHER BRANCHES OF ENGINEERING

Canadian Institute of Science & Technology, Limited
312 Chester Bldg., 219 Bay Street, Toronto 1, Ont.

Please forward free of cost or obligation of any kind your 176-page Handbook, "ENGINEERING OPPORTUNITIES."

Name .....

Address ..... Age .....

Course Interested in .....

the 99th entrained for its new station 150 miles inland in French Morocco. During a month's stay there the squadron experienced for the first time the thrill of flying brand new airplanes—27 *Warhawks*. Lieut. Col. Philip Cochran—the Flip Corkin of "Terry and the Pirates"—was the squadron's instructor and instilled in the men his own very remarkable fighting spirit. No member of the 99th will forget Cochran's opening commentary on the slowness of the *Warhawk*.

"The P-40 pilot never yet ran away from a fight—because he couldn't."

On May 31, 1943, the 99th Fighter Squadron took off for Cap Bon peninsula in Tunisia and what Davis describes as "the final phase of the experiment." There the Nazis were making their last stand in North Africa.

"I personally believe that no unit in this war has gone into combat better trained or better equipped than the 99th Fighter Squadron," Davis said. "We were weak in one respect only, and that was simply that the squadron commander—myself—and the flight commanders had had no actual combat experience.

"On the other hand, this deficiency was balanced by the fact that my pilots averaged about 250 hours in *Warhawks*, and a young pilot in these days who has 250 hours in a *Warhawk* before he goes into combat is a hard man to find."

The 99th's first combat missions were over Pantelleria, dive-bombing objectives on the island—first territory to succumb to assault entirely by air—every day until its fall. Its first bomber escort mission—*Mitchells, Marauders, Havocs* and some British *Baltimores*—was to Pantelleria. For weeks the 99th flew through a long series of monotonous missions—bomber escorts, fighter-bomber jobs and strafing enemy troops in Sicily.

Its first "kill" came on a bomber escort mission to Sciacca, Italy, when the 99th definitely destroyed one of the enemy, probably destroyed a couple more and damaged three. Gen. Dwight D. Eisenhower, soon to become supreme invasion commander, visited the field that day and congratulated Capt. Charles B. Hall, one of the squadron's flight commanders, on his and the 99th's first confirmed victory. The 23-year-old Brazil, Ind., pilot, who interrupted a pre-medical course at Eastern Illinois Teachers College to join the Army Air Forces in November, 1941, later won the Distinguished Flying Cross.

Hall is one of the few men who says he doesn't want to go home after the Germans are licked. Not long after his 75th mission, the youthful Negro flyer said:

"Of course, I would like to visit my home but I don't want to quit the war until we have won it everywhere. I figure those Japs can't be much different from German fighters. I would like to see what I could do fighting Zeros."

Last summer the pilots of the 99th flew their 500th combat mission. The date marked the squadron's first anniversary of combat service. The 99th flew 3,278 sorties during its first year of action and lost only 12 pilots. Five were killed, four are missing and three are known to be prisoners of war.

The greatest days of the 99th before it became part of the 332nd Fighter Group were those over Anzio. In one 48-hour period the squadron destroyed 12 German planes and merited this commendation from Gen. H. H. Arnold, commanding the AAF:

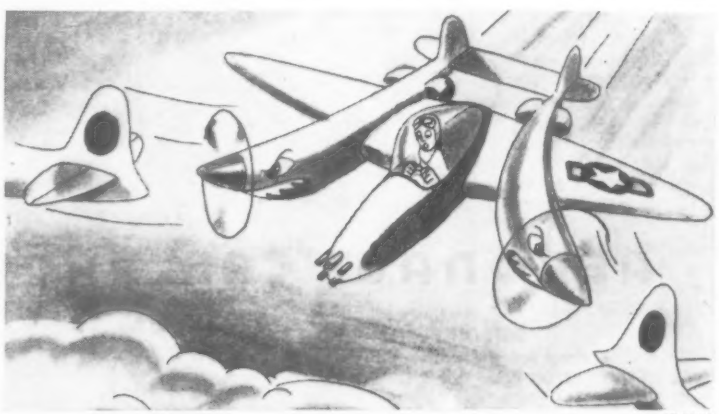
"The results of the 99th Fighter Squadron during the past two weeks, particularly since the Nettuno landing, are very commendable. My best wishes for their continued success."

Maj. George Spencer Roberts, Fairmount, W. Va., who succeeded Colonel Davis as commander of the 99th, subsequently told reporters:

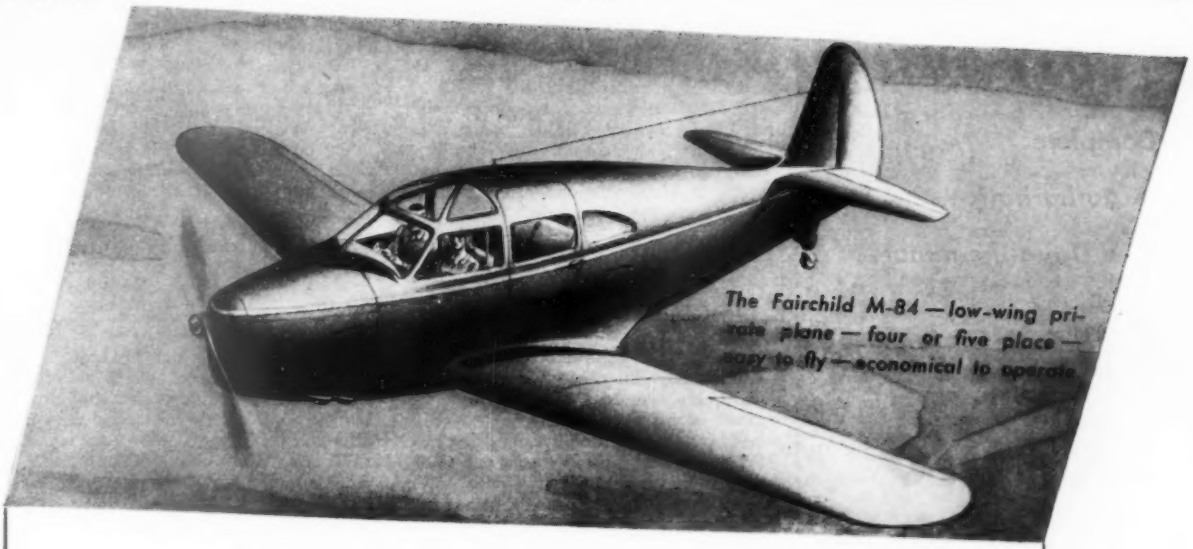
"We have not turned out to be superduper pilots—but we are as good as the U. S. Army turns out. That's important. Because we had one handicap: people assumed we were not producing because we were Negroes. Our men have been under a strain because of the civilian attitude. It is remarkable that they kept up their morale. But now that we have produced, things have changed."

Major Roberts, recipient of the Air Medal with two Oak Leaf Clusters, completed 78 missions without injury although his plane was hit by enemy bullets 73 times. When Roberts came home on leave to tour U. S. industrial plants, Capt. Erwin B. Lawrence, Cleveland, O., took charge of the 99th.

Graduated from West Virginia State College, Institute, W. Va., with a Bachelor



FLYING



The Fairchild M-84 — low-wing private plane — four or five place — easy to fly — economical to operate.

LOOKING AHEAD WITH LEAR

Fairchild believes comfort, safety and economy will be the sought-for factors in the postwar private plane.

So, profiting by the wealth of knowledge gained from the famous Fairchild PT-19 training plane used by thousands of Air Force Cadets, they have developed plans for this M-84.

Fairchild knows from way back what Lear Radios can do and has included provisions for Lear equipment in the M-84.

Lear has been making fine radio and direction-finding equipment since 1930. It is being used in private planes, commercial transports and government ships with utmost dependability. It is noted for its unusual light weight and keen sensitivity.

Lear INCORPORATED

Formerly Lear Avia, Inc.

LEAR, Incorporated — *Radio Division: Grand Rapids 2, Michigan • Aircraft Radio Sales 1860 Broadway, New York 23, New York • West Coast Subsidiary: Lear, Inc. of Calif., 1010 N. Highland Ave., Los Angeles 38, Calif*

Fairchild says this about Lear

"We at Fairchild have always found that owners of private airplanes who use Lear equipment are unanimously enthusiastic about its performance, and the installation of Lear equipment in our airplanes is ideal from the space and weight standpoint."

Fairchild Aircraft
James A. Wales Jr.
Ass't to General Manager

LEARADIO the pilots' preference

JUST OUT!

- **Complete**
- **Authoritative**
- **Up-to-the-minute**

AVIATION RADIO

by Henry W. Roberts

Introduction by
Dr. Lee de Forest

• Here, in one volume, is everything you need to know to understand and use aviation radio.

• *For everyone concerned with flying:* pilots, radio men, engineers, all who build aircraft, college and high school students, air cadets, ham radio operators, radio instructors, air-minded men and women.

• Lavishly illustrated, simply and clearly written, this book covers every detail of fundamental principles, primary and advanced radio facilities, radio navigation, design and installation of radio apparatus. *Over 465 illustrations, 652 pages, size 5⅝ x 8⅜, index, $5.00 per copy.*

YOU need this book. Order it today from your bookstore—or direct from the publishers:

WM. MORROW & CO., INC.
425 4th Ave., New York 16, N. Y.

Please send me ..... copies of AVIATION RADIO at $5 per copy.

☐ Check enclosed ☐ Send C.O.D.

Name .....

Address .....

.....

of Science Degree in 1938, Major Roberts received his appointment as aviation cadet on July 19, 1941, and was assigned to the Tuskegee Army Flying School. He went overseas with the 99th.

"The 99th flew every type of mission that I know of that a fighter can fly," he said. "Bomber escort, dive-bombing, patrol work on our beachhead, fighter sweeps, strafing missions—the gamut of everything a fighter can do. I like to fly close support work. It is extremely hazardous but it produces results which the pilot himself can see immediately."

To a question on the racial angle, the young officer replied:

"There wasn't any racial angle. We went over and got our training and the other outfits were being trained at the same time. We moved up and went to work and they moved up and went to work." END

Iwo Never Was a Pushover

(*Continued from page* 49)

his way while Morner dived for the comparative safety of a cloud. Later the Michigan boy did reach his carrier and, despite his wounds, brought what remained of his plane safely to rest with a belly landing on the pitching deck.

While Henderson, Meharg, and Morner were battling the heavy odds, other *Hellcats* had joined the melee. That first fighter sweep knocked 37 Japanese planes out of the air and strafed and bombed the air strip. Later in the day planes from another carrier finished wrecking an estimated 120 aircraft parked on the island and the battle for little Iwo was really under way.

Pilots from the Chichi Jima strike reported no air opposition at that site farther north. They had bombed cargo ships in the harbor, wrecked three big reconnaissance planes on the ground, and destroyed one heavy antiaircraft battery, three fuel dumps, and two radio stations. They were eager to get their turn at Iwo.

Through the night, however, the intensity of the storm increased. Heavy weather helped to forestall attacks on the American carriers but that seemed a dubious blessing when the rolling and pitching of the decks prevented the launching of new strikes on the morning of June 16. The task groups were just outside of the path of a typhoon; the ceiling was zero.

But the aerologists mapped a course to clearer weather and by noon planes again were taking off for Iwo Jima. Everything was Iwo-bound—fighting *Hellcats*, glide-bombing *Avengers*, and dive-bombing *Helldivers*. Although the island's airborne defenses apparently had been shattered the day before, Iwo fought back with everything it had. Antiaircraft fire was plentiful, accurate and v i c i o u s. Though most of the carrier planes returned, many were severely damaged.

Ens. Hal Crabb, of Fort Worth, Tex., slid home spectacularly, his plane hitting the deck with the hydraulic system shot away and flaps out of commission. The entire tail assembly of his *Hellcat* was pulled from his plane as the landing hook caught the cables, and his craft slid right on up the deck.

Lieut. Roy R. M. ("Hoot") Gibson of Winnetka, Ill., lost his radio when a 20-mm. shell exploded between the pilot's compartment of his *Avenger* and the stations of his crewmen, Paul Koopman, of Fulda, Minn., and Louis Blongiewicz, of Amsterdam, N. Y.

Lieut. (jg) L. S. Kalousek, of Kansas City, Mo., the "Mad Russian" of Torpedo One, flew back plaintively maintaining that "one of my wings is missing." But he landed safely despite the two-foot opening blasted through his craft.

Lieut. Harry J. Mueller, of Morton Grove, Ill., drummed up an audience for Long Tom Elliott's desperate near-miss ditching.

"There's a Two-See [SB2C or *Helldiver*] up there who can't get his bomb bay doors up, his wheels down, or his prop in low pitch," Mueller reported as he headed for the ready room after his return from Iwo. "He's in a hell of a shape."

Iwo indeed had put Ensign Elliott in a "hell of a shape." When the Edenton, N. C., boy came out of his dive after dropping his big bomb, he discovered that Iwo's antiaircraft gunners had clipped the spinner and pitch-adjusting mechanism from his propeller, had knocked the tip from one of his propeller blades, and had smashed his hydraulic system. His bomb bay doors were locked open, his diving flaps half open. He was only 1,000 feet in the air but he couldn't climb to join up with another craft because his top straight and level flying speed was 100 knots, barely above stalling speed. All Ensign Elliott could do was to plod 107 miles back to his carrier alone, mushing along at 100 knots, easy prey for a *Zero*, should one appear. After finally sighting his carrier, he managed to "shake" his landing gear down and lock it for a landing.

Air resistance built up by the lowered landing gear was too much for the laboring prop. Elliott's plane inched closer and closer to the sea. When he finally cut in aft of the big carrier and looked for his landing signals, he discovered he was looking up, not down, at the landing signal officer. There was nothing to do but ditch his craft in the sea—only 50 feet from home. Both Elliott and his gunner, Bob Scussel, were picked up a a few moments later by a destroyer.

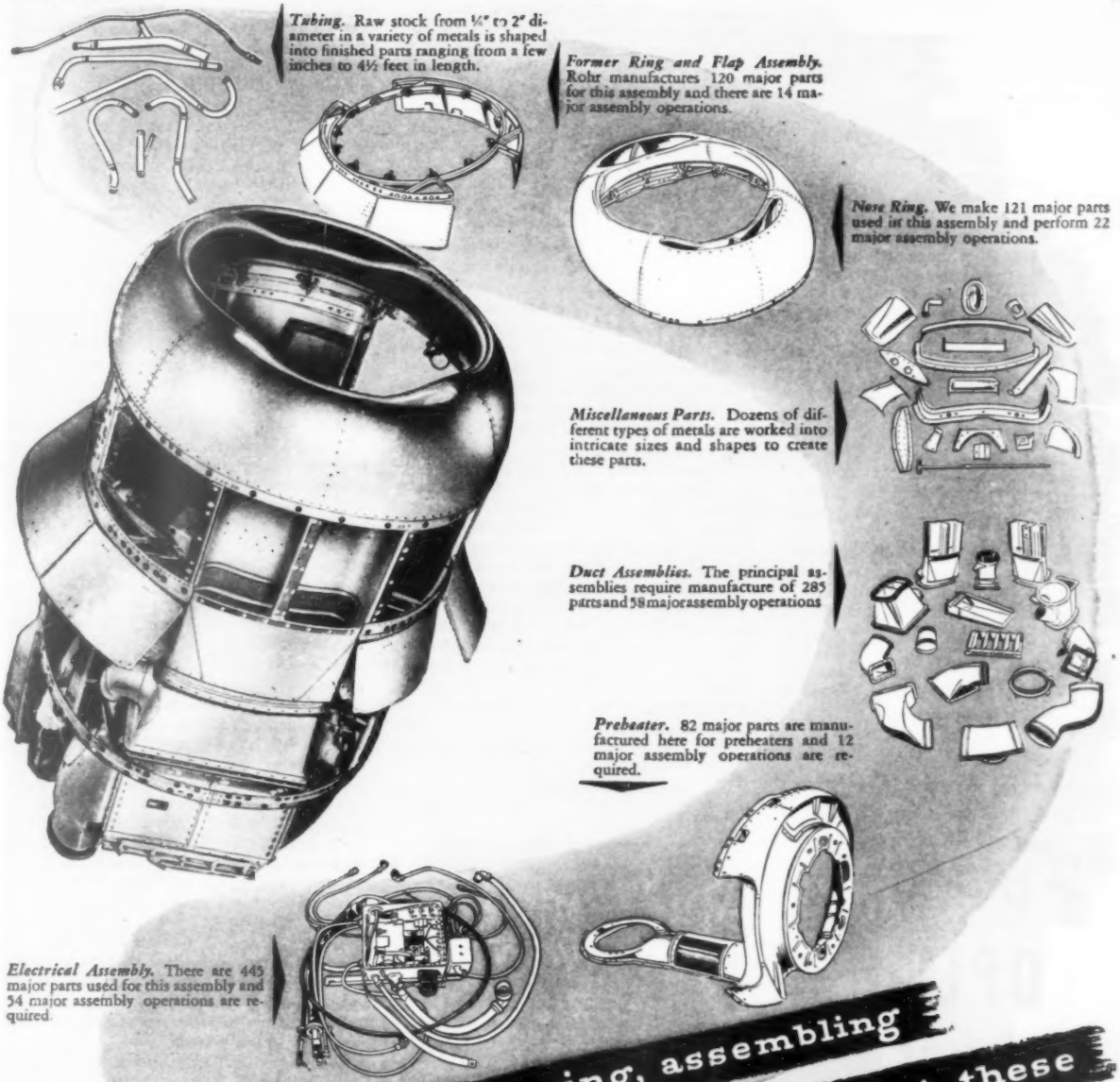
But these minor mishaps were nothing to compare with the thorough pasting Iwo took that day.

"Planes are blowing up all over the place," said Ens. T. J. Cusick, of Newark, N. J. "Whoom, they go, and then in a minute or so, whoom!"

"The place is burning up," shouted Ens. Jack Williams, of Upper Montclair, N. J.

The official report of damage to Iwo in that second day of strikes listed 22 Jap fighting planes wrecked, 22 bombers destroyed, two radio stations and two airfields knocked out of action, and three fuel dumps destroyed. Photo mapping of the island was completed.

Iwo's usefulness to the enemy appeared



Tubing. Raw stock from ¼" to 2" diameter in a variety of metals is shaped into finished parts ranging from a few inches to 4½ feet in length.

Former Ring and Flap Assembly. Rohr manufactures 120 major parts for this assembly and there are 14 major assembly operations.

Nose Ring. We make 121 major parts used in this assembly and perform 22 major assembly operations.

Miscellaneous Parts. Dozens of different types of metals are worked into intricate sizes and shapes to create these parts.

Duct Assemblies. The principal assemblies require manufacture of 285 parts and 58 major assembly operations

Preheater. 82 major parts are manufactured here for preheaters and 12 major assembly operations are required.

Electrical Assembly. There are 445 major parts used for this assembly and 54 major assembly operations are required.

over 5000 manufacturing, assembling and inspecting operations get these power plants ready to fly!

ROHR AIRCRAFT CORPORATION

COMPLETE POWER PLANT ASSEMBLIES FOR MILITARY AND CIVILIAN AIRCRAFT

ROHR AIRCRAFT CORPORATION, CHULA VISTA, CALIFORNIA • *Helping to write the story of tomorrow*

to have been shattered for many weeks when the task groups headed southwest that night to rejoin Task Force 58 for what was to develop into the First Battle of the Philippine Sea.

After the "Marianas Turkey Shoot" of June 19 and Task Force 58's long range blow at the Japanese fleet in the Philippine Sea on June 20, replenishments obviously were needed. Many pilots, having used up all of their gasoline bombing the Jap fleet, had ditched their planes in the sea. Almost all of these men had been picked up but they needed new planes. Some American aircraft had been shot down on June 19 and 20, and other planes had been damaged by gunfire or operational mishaps, even though they had landed safely aboard carriers. The force had been at sea for almost a month, and ships' fuel supplies were down. Additional food and munitions were needed. A task group was ordered to leave the task force, raid Pagan, swing north of the Marianas, dash to a Marshall Islands base for supplies, and return to the combat area.

The trip north of the Marianas again would put fast carriers in the Iwo Jima area. When Adm. J. J. ("Jocko") Clark, rough and ready commanding officer of the group, suggested a passing fighter plane wallop at the little island which had been hammered so vigorously barely a week before, all hands cheered. Remaining munitions supplies could be put to good use there, and fighter squadron "virgins" would get one more chance to knock down Japs in a softened area.

Of the 48 *Hellcats* which took off for Iwo at dawn on June 24, however, only four ever reached the island to drop their fragmentation bombs on air strip installations. The Japs on that day served notice that Iwo was to be a battle ground. The *Hellcats* found they still had "30 more cornered" at Iwo.

Tokyo's crack air group had flown 150 fighting planes to the little island after the June 15-16 strike. These enemy planes were in the air and ready when the June 24 attackers roared in at 12,000 feet. American pilots thundered joyously down on Iwo's defenders at 8,000 feet and 3,000 feet only to discover too late that they had gone after the bait and that other Jap planes were circling in the clouds at 15,000 feet. As each *Hellcat* attacked a Jap plane another Jap dived from the clouds on the *Hellcat's* tail. The American flyers had been trapped.

Tokyo, however, had laid its trap without calculating the fury of American fighting men when the chips are down. These pilots simply jettisoned their bombs, slugged their way through an all-out aerial free-for-all, and brought 44 of those 48 trapped aircraft safely back to their carriers. The Japanese, who had sprung the trap, lost 58 fighting planes and 10 bombers that morning—17 aircraft for every American plane shot down. It was a bitter lesson for Iwo, and one the island garrison did not propose to accept without a bid for revenge.

The battle-worn American carriers were within easy reach of Iwo's land-based aircraft and a torpedo or bomb in one of these ships might more than repay Iwo's airmen for their ignominious defeat. Busy Iwo loaded flight after flight with deadly explosives and sent them racing after the carriers as the ships plowed eastward, carrying probably fewer than 60 flyable fighter planes among them with which to turn back the repeated enemy attacks.

Twelve of Iwo's *Kates*—Japanese torpedo planes—struck first at about 10 a.m. *Hellcats* polished off 11 of them in less than 10 minutes, and the 12th *Kate* fled in apparent dismay.

Fighter craft from the decks of the two CVL's hammered three more flights from Iwo out of the air during the next hour. At 11 o'clock the guns of one of the destroyers began to roar. A lone *Kate*, probably the survivor of these first 12, had circled the entire task group and was weaving through the destroyer-cruiser screen, barely above the ocean's surface, in a frantic attempt to strike at least one carrier. A fighter plane dived into the antiaircraft fire of the destroyer to pick off the only Jap plane which even reached the carrier group.

Throughout the afternoon the carriers' pilots kept their *Hellcats* in the air constantly. They turned back five more Japanese sorties, and even discovered groups of other Japanese planes being ferried from the Volcano Islands to bases in the northern Marianas. Gleefully they tore gaping holes in these formations, too.

When the task group at last lunged beyond smarting Iwo's convenient range, its pilots, despite a dwindling supply of airworthy planes and ammunition, definitely had shot 114 Japanese planes out of the sky and had scored many additional probables. That was a new record for planes shot down by a single task group in a single day.

Tokyo, however, had made its stand on Iwo clear. It was evident that no strategic retreat would be attempted there. Japan was pouring its top manpower and supplies into the island outpost and intended to hold it at any cost.

When the Marines finally went ashore in February, Japan, because of Naval blockade, no longer could reinforce Iwo. It had been bombed for 74 consecutive days. Intermittently it had been shelled by cruisers and destroyers. For three solid days from February 15 to February 18, a Fifth Fleet bombardment group had stood off Iwo and pumped heavy explosives into the island's fewer than 10 square miles. On February 19 new battleships added the thunder of their big 16-inchers to the bombardment symphony. Carriers sent bombing planes over on repeated strikes where resistance was knottiest.

Seven thousand tons of screaming shells, and many times that tonnage of block-busting bombs pounded and rocked Iwo Jima, but when the Marines stormed over the beach on Feb. 20 the tiny island's volcanic crags still were spitting a deadly curtain of fire. Dramatically foreshadowed, these were the tasks that U. S. airmen must perform before the last 30 Japs are cornered in Tokyo. END

For PEOPLE

WITH AN . . .

Eye to the Future

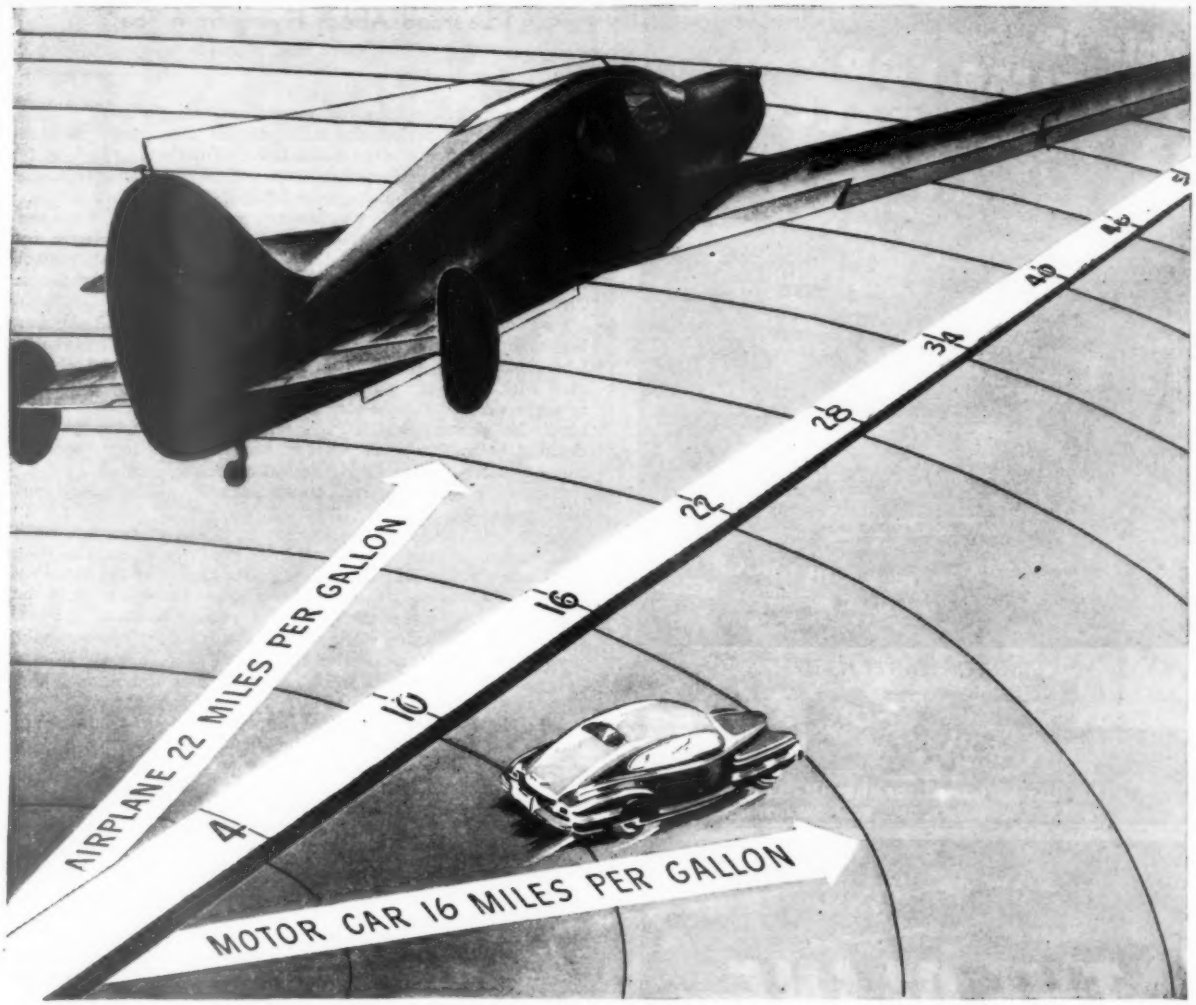
THE B-75-L

Funk

It's your plane for after-the-war traveling. Designed smartly and comfortably and powered with the famous Lycoming 75 H.P. motor, known for dependability. The Funk B-75-L is easy to operate, safe, and low in operation cost. Watch for the B-75-L. It's the plane for post-war traveling! Descriptive literature on request.

Funk AIRCRAFT COMPANY

COFFEYVILLE, KANSAS



Bellanca Cuts Airplane Operating Costs to Less Than the Average Motor Car

The Bellanca Cruisair was built to fly 22 to 25 miles per gallon of fuel as compared with the average gas consumption of 16 miles per gallon for popular low-priced family cars.

Bellanca's new family plane will embody all of the favorable characteristics of the pre-war Cruisair, including the feature of *extreme fuel economy*. This asset is a direct index of the efficiency of Bellanca design — the efficiency which enabled Bellanca planes to achieve so many outstanding world aeronautic records, such as the historic flights over the Atlantic and Pacific oceans, the establishment of the World's Non-refueling Endurance Record of 84 hrs., 33 min., and other Bellanca "firsts."

Operating economy is but one of the low-cost features of Bellanca's light plane design. Sturdily built and needing little maintenance or servicing, the re-sale value of Bellanca planes has always been high, reflecting the extreme utility, ruggedness and efficiency of Bellanca-built products.

Post-war Bellancas will be economical to operate, easy to fly, outstanding in performance, smart and smooth in design! . . . Bellanca Aircraft Corporation, New Castle, Delaware.

The BELLANCA *Cruisair*

BUY WAR BONDS

this is
NO TIME FOR
A TRIAL BALLOON

There's no need to buy pencils of undetermined origin when you can use the pencils that have already made their mark.

For many years, the KOH-I-NOOR Pencil Factory has been producing pencils uniformly graded in smoothly finished straight grained cedar.

TRY A KOH-I-NOOR TODAY
THERE ARE NO "STRINGS" ATTACHED

SEND FOR LEAFLET No. 17

KOH-I-NOOR

The RIGHT pencil for the RIGHT job
KOH-I-NOOR PENCIL COMPANY, INC., BLOOMSBURY, NEW JERSEY

THE PLANE
FOR YOU
AND YOURS
- TOMORROW

COMMONWEALTH
AIRCRAFT

COMMONWEALTH AIRCRAFT INC., KANSAS CITY, KANS.
formerly Rearwin

I Learned About Flying from That!

(Continued from page 78)

"Glad you fellows enjoyed yourselves," he shouted.

We took off, circled the field, dipped our wings once in salute and set a course for Spirit Lake. For the first time in 10 hours I breathed comfortably. I turned the plane over to Arnie —now that the tension was over I felt sleepy.

"Wake up, Al!" Arnie was jabbing me in the ribs. I opened my eyes. "We're out of gas. You take it!" he was plenty excited. What a couple of dopes we had been—hadn't even checked our gas, we were so darn anxious to get out of Sioux City.

I was wide awake now. Altitude 2,200 feet. Spirit Lake was less than five miles away, but obviously we couldn't make it. I banked. Below the country was rolling pasture land, checkered with fields of rippling corn. There were no paved roads in sight. About a mile southeast was a straight, narrow dirt road. No phone poles . . . low fences but pretty far apart. I decided to try the road. I banked slowly making gentle S turns towards the road. Altitude 700 feet.

"I don't know," said Arnie dubiously. "Looks mighty narrow."

Arnie was right. The road was only about 10 feet wide and was flanked on both sides by a deep drainage ditch. The road itself was a ribbon of mud. I knew now that even if I could set the plane down on the narrow road it would nose over in the soft mud. All my flight instruction was forgotten. At less than 50 feet altitude I jerked back the stick trying to stretch my glide towards an open spot in the field.

We stalled, nose high, the plane quivering and settling fast. My frantic effort to increase our glide had brought us directly over a good 10 feet of Iowa's famed tall corn. Just as the nose came down the ship hit the corn. We sank through the green stalks and came to rest right side up.

We got out and looked at the plane. Not a scratch on it. No holes in the wings. The prop had died parallel with the ground and since we hadn't nosed over it didn't appear to be damaged.

Farmers began to appear. Bare-footed kids with rich Iowa mud between their toes seemed to be coming right out of the ground. Arnie took charge of the situation.

"We're on our way to Minneapolis from the Army base at Sioux City," he informed our public. The farmers nodded understandingly. Eight husky men picked up the plane as though it were a sack of feed, carried it out of the field, across the ditch and placed it on the muddy road.

The nearest gas was reported to be at a nearby farmer's barn. Arnie trudged down the road with a covey of mud-spattered youngsters at his heels. He was back in 10 minutes with five gallons of tractor gas.

The engine caught at once but there was no use trying to taxi. The sticky mud sucked at our small balloon tires and the plane just wouldn't move. Questioning brought out the information that there was gravel "around the bend" and we might be able to make a take-off there.

I sat in the plane, the motor idling, while Arnie directed the men in how to push a plane. "Around the bend" meant three-quarters of a mile. There was loose gravel but the road was relatively hard. The wind was south, the road ran east and west. Along the south side ran a telephone line. At the bend in the road which we had just passed was a silo that looked like the Empire State building to me. Altogether we had about 600 feet in which to get off, clear the silo and get over the wire. Arnie climbed in.

Throttle full on I released the brakes and we picked up speed. I eased back on the stick till we cleared the ground. Holding the ship down to gain speed we made a steep climbing turn barely missing the silo and the phone wires. Five minutes later we were at Spirit Lake, after four hours' delay.

We gassed up to the brim of the tank. Advising the clearance officer that Sioux City was not open to civilian pilots, we made our take-off and arrived in Minneapolis two hours later without incident. We had learned the hard way that it isn't safe to go anywhere without checking your gas supply before each take-off. We had also learned that considerable embarrassment can be avoided if a pilot checks ahead to make sure of airport facilities. We haven't been caught since. END

P3-B *Pioneer Parachute* PREFERRED

Test pilots and navigators, bombardiers and turret gunners who must necessarily fit into cramped quarters, as well as civilian flyers prefer the P3B — the most popular 'chute in service today.

Compact, ultra-thin and snug fitting, the P3B is 20% lighter and occupies 50% less seat space with no sacrifice in strength — yet the canopy is the full 24 foot standard size. The P3B is "tops" because it is the culmination of the engineering skill and constant design advancement by the men who pioneered the making of parachutes. The P3B is standard equipment of the U. S. Army and Navy.

The P3B fits into the smallest of spaces without restricting movements of wearer because of it's body hugging quality and ultra-thinness.

← Note how easily and comfortably the P3B fits when worn in normal sitting position. Harness is easily adjusted.

The P3B is the most compact, snug fitting, back type 'chute available today. The complete weight is only 19 pounds. →

PIONEER PARACHUTE COMPANY, INC.

MANCHESTER, CONNECTICUT, U. S. A.

CABLE ADDRESS: PIPAR. TELEPHONE: Manchester 4157

WEST COAST FACTORY BRANCH, 109 SOUTH CENTRAL AVENUE, GLENDALE 4, CALIFORNIA

A New Code for Aircraft

(*Continued from page 55*)

clined to believe is too restrictive—is the section placing a lower limit on the selection of design speed in relation to actual high speed at sea level. Normal, transport, training and aerobatic types are affected by the proposed minimum airspeeds. This provision of the code was reviewed at a recent conference between CAA, CAB and the Airworthiness Requirements Committee of the Aeronautical Chamber of Commerce, which represents the U. S. aircraft manufacturing industry.

In the air-carrier division of the international code, the stalling speed requirement has been eliminated. Our CAR now states it shall not exceed 80 m.p.h. Among problems closely related to stalling speed are visibility and low-speed flight characteristics in air carrier operation. But if the stalling speed is to be eliminated, certain changes in airline operating rules would become necessary. It is difficult to measure stalling speed accurately and a two per cent decrease in that speed necessitates a 20 per cent reduction in payload.

The CAA feels that stalling speed can be eliminated from our air regulations if airports, navigational facilities, en route climb with one engine out, and weather minimums are accounted for and suitably adjusted. However, weather minimums can be overlooked only when straight-in approaches to runways are possible with 100 per cent regularity, as when radar is used. Until the straight-in approach becomes routine, however, weather minimums will continue to be important since a pilot, in breaking through an overcast, may have to circle an airport. His minimum flying speed thus will determine the smallest radius of turn and, therefore, the distance from the field he must fly. Airline operators are vitally concerned over any change in the present stalling speed, if it will adversely affect the regularity of completed schedules.

A proposed elimination of maximum stalling speed for transport types of aircraft is based partially on anticipated increased safety resulting from another Chicago proposal—a higher rate of climb with one engine inoperative. The new code doubles the one-engine-out rate of climb set forth in Civil Air Regulations. But the one-engine-out performance, as written at Chicago, makes no differentiation between twin-engine and four- or six-engine planes. Some experts believe this would automatically result in planes with six or four engines being less safe than two-engine planes, since an all-engine-in rate of climb is not specified.

Compliance with Section 2.31611-T as proposed, calling for air carrier windshields to be designed for impact of a five-pound bird at maximum flight speed, would place a heavy weight penalty on operators. It has no counterpart in our Civil Air Regulations.

Under the design and construction section of the Chicago code, the ditching requirement states that all occupants must be able to evacuate the airplane in not more than 30 seconds. Manufacturers believe this will be difficult to prove, because it has been military experience that some bombers float anywhere from one minute to a week after ditching.

An important innovation in the Chicago code is the requirement that operating manuals be provided for all types of aircraft, not merely for transport types as under existing U.S. regulations.

Among other changes contained in the international code are two initiated by the U. S. Army Air Forces. One would introduce the use of the wing lift method for making energy absorption tests of landing gear. The other would permit landing load factors to be based on acceleration obtained in actual drop tests.

Great Britain's major objection to the code is centered on Articles 39 and 40, which prescribe rules for certifying airplanes and pilots in international operation. Briefly, Article 39 provides that any aircraft which fails to satisfy terms of the airworthiness code at the time of its certification must carry a list of the ways in which it does not comply. The other paragraph of the article applies the same rule to holders of pilot's licenses.

Article 40 contains the teeth for enforcement of Article 39. That article says that no unqualified aircraft or personnel shall participate in international navigation, except with the permission of the nations whose territory is entered. The use of any such aircraft, or even of its parts, in any foreign nation would be at the discretion of the foreign country.

From the standpoint of safety, Articles 39 and 40 cannot be opposed. Countries should not be expected to open their air space to foreign aircraft, the Chicago conferees agreed, without some assurance that the aircraft have been built with at least one eye on air safety factors. In other words, although the Chicago convention offers each country free air space over all other countries ratifying the international agreement, the freedom actually is extended only to aircraft and airmen certified by the terms of the airworthiness code.

It is the opinion of Great Britain (as expressed unofficially) that within the realm of good air safety practices, however, deviations from the provisions of Articles 39 and 40 can be granted without nullifying the force of the international code. For example, Great Britain might conceive a new structural procedure which doesn't conform with existing international airworthiness practices but does appear to be technically justified. She would like to go ahead on her own authority and build an airplane incorporating the new structural member, without waiting many months for possible approval of the proposed international air council.

Great Britain also would like, if necessary, to fly such an airplane into other countries without first submitting for in-

COCKPIT "BLACK LIGHT"

INSTALLATION of "black light" or ultra-violet ray bulb illumination of the cockpit on all TWA airliners gives greater night vision to pilots. Dials and gauges painted with luminous lacquer and illuminated with the ultra-violet ray (above) are more easily read and impose less eyestrain.

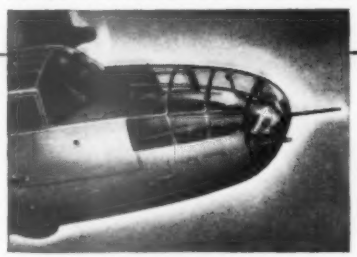
Photos below illustrate reaction of eye pupil after 20 minutes exposure to total darkness (left) "black light" (center) and incandescent lighting (right). The object: to obtain the greatest pupil area for best vision.

BONDS bought these planes.
WASTE FATS helped arm them.
WASTE PAPER helped ship them.
GASOLINE flies them.
WILL YOU help deliver the next squadron?

Jack of all Raids

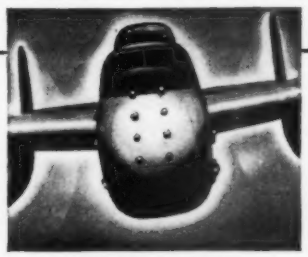
Target of opportunity, the long suit of any B-25 Mitchell, and when the target does not readily present itself, you can depend on American pilots to make the opportunity. Whether it's a bombing mission requiring pinpoint precision or busting up a jungle troop concentration with lawnmower efficiency, the B-25 takes them all in stride. To the Japs, this rugged plane is nicknamed The Flying Pillbox; to American pilots, it's the work horse of the Army Air Forces.

THREE MODELS OF THE B-25 MITCHELL—EACH DESIGNED FOR A SPECIAL TYPE OF COMBAT OPERATION



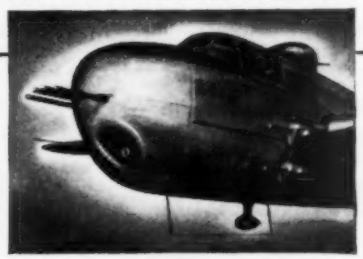
PINPOINT

This is the bomb-sight nose of a B-25 Mitchell. This model is used for pinpoint precision bombing from medium altitudes.



PENETRATION

B-25 Mitchell with eight 50-caliber machine guns in the nose. This model used for penetrating jungle undergrowth.

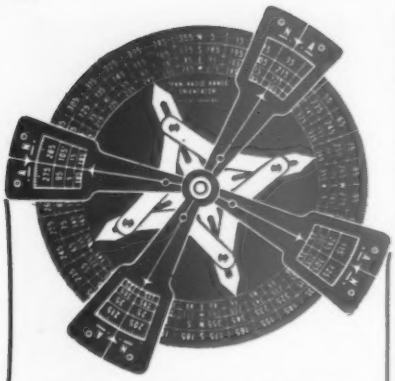


PUNCH

Famed 75 mm cannon nose of the B-25 Mitchell delivers knockouts to pillboxes, punches holes in Jap communications.

North American Aviation *Sets the Pace*

PLANES THAT MAKE HEADLINES... *the P-51 Mustang fighter (A-36 fighter-bomber), B-25 and PBJ Mitchell bomber, the AT-6 and SNJ Texan combat trainer. North American Aviation, Inc. Member, Aircraft War Production Council, Inc.*



SIMPLIFIES INSTRUMENT FLYING!

DEAN RADIO RANGE ORIENTATOR

and TURN and HEADING COMPUTER

The only instrument of its kind . . . **Gives constant visual picture of radio range. Instantly and Accurately** tells (1) Bisector Headings, (2) Time required for any given amount of turn, (3) Headings to fly during turn-around procedure, (4) Perpendicular heading to any selected beam leg, and (5) Right angle course to average bisector. Needed by every instrument pilot and student.

AVAILABLE AT LOCAL AIRPORTS EVERYWHERE

Price Only $10.00 Including CARRYING CASE

Distributed by

Aetna Aircraft Sales Corp., Chicago
Aero Service & Supply Co., Birmingham, Ala.
A. W. Whitaker, Portland, Oregon
Omaha Aircraft Co., Omaha, Nebr.
Aeronautical Trading Co., Jamaica, N. Y.
Northern Air Service, Grand Rapids, Mich.
Air Associates, Inc., Chicago, Ill.
Pacific Airmotive, Glendale, Calif.
Southwest Airmotive, Dallas, Texas
General Aircraft Supply, Detroit, Mich.
Carrow Navigation Service, Houston, Texas
Air Associates, Inc., Dallas, Texas
W. B. Matthews Co., San Antonio, Texas
Otto Aviation Corp., Bloomfield, N. J.
Aviation Supply, Salt Lake City, Utah
H. V. Bordeaux Co., Los Angeles, Calif.

or Write

AVIATION ASSOCIATES

664 N. MICHIGAN AVE.
Chicago 11, Illinois

NEW — just published!

THE **Aeronautical Dictionary**

OVER 6000 ENTRIES, ILLUSTRATED

★ Over twice as many terms as any other book at its price.
★ All definitions in one alphabetical order.
★ All definitions in plain English, illustrated where necessary.
★ Contains 2000 terms never before explained in book form.
★ By *Thomas A. Dickinson*, author of the Aircraft Construction Handbook, and technical writer for Consolidated Vultee Aircraft Corp.
★ 484 pages; 268 drawings and photographs; handy 5¼" x 8¼" size; durable cloth binding.

$3.50, *at all booksellers, or postpaid from*
THOMAS Y. CROWELL CO., 432 4th Ave., N. Y. 16, N. Y.

spection in each country a statement explaining the manner in which it did not measure up to a hard and fast airworthiness code. Her position is that if deviations to cover technically-sound developments are not recognized, the proposed airworthiness code will be impracticable and will retard aviation progress. In fact, if deviations are not granted under the code, Great Britain may attempt to relegate the greater part of the code to "recommended practices."

Dr. Warner, who believes the problem of deviations can be resolved, recently asserted:

"In view of the fact that most of the members of the council will represent aircraft-consuming rather than aircraft-manufacturing states, and will have a natural desire to keep the sources of their own supply of aircraft as broad and free as possible, I should expect the council to act with great caution in taking any action which might seriously restrict the manufacturers in any country in developing aircraft, or which might force them to conform to an airworthiness code that seemed liable to develop obsolescence through timidity or inertia."

Dr. Warner also suggests a full-time international technical staff for the council, to conduct studies and prepare recommendations on modification and improvements of the international airworthiness code. Such a staff would help to keep the council up to date on new technical developments.

One of the more curious aspects of the Chicago conference was that the American aircraft manufacturing industry did not participate, even in a consultant capacity, in discussions designed to develop an international agreement on airworthiness standards for airplanes they will make after the war. The industry, as represented by ACCA, had no opportunity to submit in writing a co-ordinated opinion of the airworthiness proposals before they were presented to the conferees in Chicago.

The ACCA received copies of the CAA proposed draft on September 23 and on October 18 notified the CAA by letter that the aircraft industry could not meet the October 10 deadline for comment in the short time allowed. At the same time, the ACCA placed itself on record as opposed to the CAA draft proposal as a basis for the establishment of international agreement on minimum airworthiness requirements as they differed from the current Civil Air Regulations.

Dr. Warner subsequently agreed that the time allowed all interested groups to appraise and comment on the Chicago proposals was far too short. But he pointed out that it was better to press ahead with a program, regardless of its drawbacks, than to lose the opportunity of starting technical discussions. There is still ample time and opportunity for review of all provisions of the air-worthiness draft.

It is a matter of record that the ACCA's Airworthiness Requirements Committee, convinced that the tentative agreements reached at the Chicago conference on airworthiness do not reflect fully the opinion of the manufacturing industry, intends to make no counter proposals to the international proposal. Instead, the ARC is now in the process of recommending to the CAA improvements in the US. Civil Air Regulations and hopes that those recommendations will form the basis of suitable revision of the proposed international agreement before it is presented for final ratification. The ACCA has notified the State Department of its intentions and has requested representation at Montreal. E. E. Wilson is president of ACCA; E. W. Norris is chairman and I. C. Peterson is secretary of the ACCA Airworthiness Requirements Committee.

The Air Transport Association, of which A. W. Dallas is director of engineering, also was opposed to the CAB's submitting to the delegates in Chicago rules not yet adopted in the United States. Comments of the ATA on the airworthiness code as drafted at Chicago will be submitted to the CAA soon. Like the aircraft manufacturing industry, ATA was irked because it was not granted ample time to file comment on the air safety code before Chicago.

However, at the request of CAB, the association did send representatives to Chicago after the conference began, but the ATA felt that it was too late and little was accomplished by the somewhat belated action.

Out of this confusion, all concerned are agreed, must come an international airworthiness code capable of carrying on the post-war job for which it is intended. There seems equal agreement, despite the controversies over details, that all differences will eventually be resolved. First step in this direction is expected as a result of the meetings in Montreal. And an anticipated salutary by-product will be parallel improvements in CAR airworthiness requirements in this country, particularly in the non-air-carrier category. END

SCREWY SKYMASTER

A "SWOOSE-LIKE" plywood mock-up of a Douglas *Skymaster* gives a realistic touch to the training given students at the Western Technical Training Command at Santa Monica, Calif.

Wings salvaged from a Douglas *Havoc* house four small four-h.p. engines that operate the instruments in the cockpit, giving readings similar to those in flight. An electric-driven pump actuates hydraulic systems.

Continental Red Seal Engines

POWER TO WIN

Awarded to the Detroit and Muskegon Plants of Continental Motors Corporation for High Achievement

Bazookas on the wings of "Grasshopper" Planes! What next? . . . These versatile planes most certainly are playing an important part in this war. Many of their accomplishmenrs are spectacular — many others although merely routine are equally as dangerous. While some "Grasshoppers" are spotting enemy positiuns and directing artillery, others are delivering supplies to their "buddies" in trouble, or carrying wounded for hospitalization.

But whatever the assignment, the job is well done. Second only to the pilot in importance are the dependable Continental Red Seal 65 horsepower engines that perform daily in thousands of these "Grasshopper" planes — in all kinds of weather — all over the world.

Your Dollars are Rower, Too!
Buy War Bonds and Keep Them!

Continental Motors Corporation
Aircraft Engine Division
MUSKEGON, MICHIGAN

Pilots with chapped, cracked, dry lips get back on the beam with CHAP STICK. Specially medicated, specially soothing, *the one and only* CHAP STICK soothes and relieves lips that suffer from weather and climatic changes.

T. M. Reg. U. S. Pat. Off.

On sale at drug counters only 25¢

KEEPS LIPS FIT

Excellent for Water Sports

...The natural aid to better performance in all sports! Restful OCULENS Sunglasses filter out harmful, strain-producing direct and reflected sun rays. Prevent that hard, drawn, tired look — Buy a pair of OCULENS at your favorite store today.

Eliminate Sun-Squint, Sun-Blur, and Sun-Glare without MASKING Clear Vision and True Color Values. OCULENS Sunglasses meet U. S. Army specifications for absorption of infra-red and ultra-violet rays.

Oculens *Trademark Comptone Company, New York

CLEAN VISION SUNGLASSES

Get a Tough Instructor

(*Continued from page 56*)

because no one really knows the answer. Grammar school and high school teachers have been criticized in many a small town because pupils graduate from our school systems who cannot add, multiply, spell or write an elementary essay. Yet many educators and psychologists still cling to the theory of the second chance—and they want to apply those same methods to flight training.

There are plenty of examples to show that soft instruction fails to produce safe, competent pilots. One concerns a young man, a psychology teacher, who took a check flight with an experienced pilot. This pilot had flown several thousand hours and had an excellent record with his students. He was a "tough" instructor who knew his business.

The flight began with an erratic, wing-low take-off. The airspeed varied, the heading was not constant, and the plane was banked erratically at about 450 feet. At the cross-wind position the young fellow snapped the throttle shut and started a turn which was so poorly planned that he was down to 15 feet altitude without having completed his turn! With one wing down and still turning, he broke his glide and attempted the landing, which was not quite three point and therefore disqualifying.

The red-hot remarks of the pilot were later cited by the psychologist as evidence that the pilot was not a good instructor! A good instructor should have calmly analyzed the student, given him another chance, coached him along—so say the critics of tough instruction. And yet that student had about 40 hours and was superbly confident that he was "hot." "Soft" coaching would never have convinced him of his unairworthiness. But the red-hot remarks *did* get under his skin, even though he didn't like it very much.

Flying is a game in which one just doesn't dare to be easy going. Fun? Sure, it's fun, but you've got to be alert and strict with the airplane and with yourself. It's like any competitive sport, from football to skeet. When you let down, you lose—only losing in the flying game is likely to be pretty permanent. Planes are relentless, unforgiving and tough with those who become cocky, careless, or over-confident. That's why one should have a tough instructor.

We'll try to analyze a "tough" instructor in a moment, but first it should be made clear that tough instruction does not involve brutality. It certainly does not mean that an instructor should talk too much, too violently, use profanity toward the student or attempt to haze him. Such instructors are responsible for comments like, "Sure, I learned to fly, but mostly in spite of my instructor, not because of him."

The basic element in tough instruction is safety. The major premise is, simply: It is better to bump into a few harsh words than into the side of a mountain.

Of course the variable factor in any sort of instruction is human nature. Pilots differ from other persons in being much more individualistic. Aviators are a group of separate thinkers not only because the art of flying attracts a free lance, but because one must be on his own all the time in order to survive.

That means one is apt to find it hard to standardize instructors. The attempt has been made by the Army, the Navy, and by CAA, but without too much success. As a CAA inspector, the author has given flight tests to applicants, passed them, written out their certificate, only to hear this as the new flight instructor walked out of the office, "Okay, boys, now let's get back where we came from and fly just as we did before!"

But even though it is hard to standardize instructors, it is possible for a student to pick an instructor according to certain standards. Those standards are clear and easy to define—though they are not to most student's liking. But a student's dislike for a course is no indication that the course is without value.

Take for example the student who took off with his instructor for some low-altitude emergency work, shooting landings in small fields and the like. As most pilots know, this calls for cutting the gun in tough spots, and for brisk recovery of flying speed by forward pressure on the stick. The action often throws the plane down—and the passengers upward.

Forgetting previous instruction, the student failed to fasten his safety belt. The instructor noticed the omission as he got into the airplane. He climbed to 2,000 feet and pushed the stick easily forward. The astonished and frightened student rose two feet out of the cockpit, turning a dull green. Scared? Indeed he was, but he never forgot that lesson nor did he forget the vitriolic lecture he received from the instructor, who took him right back to the field and threatened to wash him out if the incident occurred again. Years later the instructor heard, in a roundabout fashion, that his student claimed that was the best flying lesson he had ever received.

Sure, the student disliked a bawling out, the "tough" instruction. And the person who checks out in a lightplane after the war will not like such instruction either. He'll be tempted to seek out the "soft," smooth, flattering type of teacher.

Don't accept such instruction! It is worthless and will teach you approximately nothing. More than that, it will leave a pilot or student with no lasting impression. One remembers the searing, burning events in his life, not the sugar-coated ones.

Go to your prospective instructor and tell him "I'm looking for good instruction. I want to be criticized, not praised. I want my faults stepped on, especially those short cuts to the grave. When I make a blunder I want to be corrected, but when I repeat that blunder I want all hell to break loose. And I promise you I'll come back for more instruction if you do this—and I won't ever come back if you don't."

Next analyze both the instructor and

This advertisement is one of a series on new or improved Thompson products that will speed postwar progress—automotive, aeronautical and industrial.

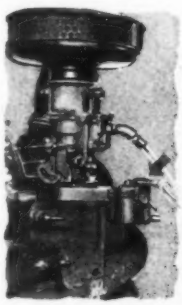
A Life Saver for Fighter Pilots

becomes a Power Booster for Cars and Trucks

The Thompson Vitameter

MANY A PILOT in this war has lived to fight another day because of a power-boosting device on his plane which gave him an extra burst of speed to get out of a tight spot in combat.

This surge of extra power comes from an injector that shoots a mist of cold water into the engine.



The new Thompson VITAMETER applies this same aircraft injection principle to automotive engines, and is ready for postwar cars, trucks and buses—old and new.

The VITAMETER, on an automobile, has the supercharging effect of stepping up the gasoline 12 to 15 octane numbers. It kills "ping" even on steep grades and under heavy load. This device is at its best with lower-priced gasolines. Bolted to the carburetor flange, it automatically meters a special cooling mixture, VITOL, into the fuel charge *only when needed.* This is approximately 2% of the operating time of a passenger car and somewhat higher for trucks and other heavy-duty vehicles. VITOL softens harmful hard-carbon and keeps the inside of the engine cleaner. The car owner who has a VITAMETER after the war will save its cost many times over. Fleet operators will save much more, per vehicle.

The VITAMETER is but one of many new or improved products that Thompson engineers have ready for postwar automotive, aircraft, railway, mining and industrial markets. Meanwhile, Production for Victory is commanding the energies of Thompson men and women in six cities.

Beating Production Schedules on Vital Parts for Planes, Tanks, Submarines, PT Boats, Torpedoes, Jeeps, Half-Tracks, Tractors and Trucks.

Thompson Products, Inc.

THOMPSON AIRCRAFT PRODUCTS CO.

Manufacturers of Automotive, Aircraft and Industrial Parts and Accessories—General Offices: Cleveland—Plants in Ohio, Michigan, California and Canada

ELECTRICITY

To Meet Aviation and Aircraft Industry Power Needs

ONAN ELECTRIC GENERATING PLANTS provide power for many applications in the aviation industry. Available in 65 models including Airborne, lightweight, compact types. Powered by Onan-built gasoline engines, they are of compact, single-unit design. For heavy duty service, stationary or mobile.

Models range from 350 to 35,000 watts. A.C. types from 115 to 660 volts; 50, 60, 180 cycles, single or three-phase; 400, 500 and 800 cycle, single phase; also special frequencies. D.C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

Model shown is from OTC lightweight series.

ELECTRIC PLANTS Onan

POWER AND LIGHT FOR EVERY NEED

D. W. ONAN & SONS
2191 Royalston Ave.
Minneapolis 5, Minn.

PILOT TIME

CERTIFICATE FOR

Qualified Pilots!

Yes, rated military and commercial licensed pilots are now qualified for the Nation's Only Pilot Time Certificate. Beautifully illustrated and lithographed in two colors, you'll be proud to frame the large (10 x 12½) certificate and hang it in your home or office as evidence of your skill and ability. Duplicate billfold size certificate, waterproofed and laminated, also included. Certificates show your name, pilot time and date. FREE renewals are issued at later date with new pilot time. Send for application blanks NOW, as time must be certified. You'll want one for yourself, your family, wife or sweetheart. Only $5. Don't delay. Act NOW.

Send for Certifying Blank NOW!

Send me information for having my time certified for Pilot Time Certificate.

Name_____

Address_____

City_____ State_____

(Do not enclose money with this coupon)

DAVIS & DAVIS

Capitol Sta. Box O. Austin 11, Texas

yourself. You are a separate problem and outside the scope of this article. Briefly, you must be able to use your head. If you can think in the air, you can fly. If you must depend upon a rule book, or someone's advice, or a pre-determined course of action for your procedures, don't fly! The game is unhealthy for such people.

Analyzing the instructor isn't so difficult. You're going to do it whether or not you read this article. The trouble is that you may judge him on the basis of his personality, which often has little to do with the main objective—the teaching of safe flying. So, disregard the personality angle.

Turn instead to the hard-boiled business of flight instruction. Taking it for granted that the CAA has certificated the pilot and that he can really fly, judge him solely on the basis of the question, *is this instructor teaching me how to fly safely?* Is he correcting my mistakes firmly and is he raking me over the coals when I commit the unpardonable sin of repeating an error? Is he giving me a good, tough ride by making me think all the time, training me to become a "savvy" pilot?

Note especially the instructor's standards. *He* may be a good, smooth, competent pilot, but does he insist that *you* become one? Does he hold you to the right altitude, allowing only the smallest possible margin of error? (You should hold the altitude around your field to within plus or minus 50 feet as a student or 10 feet as a finished pilot.) Does he insist that you fly with the ball-bank indicator centered, neither slipping or skidding? (The ball should be exactly on the center, and that doesn't mean just a teeny-weeny bit off either, it means right on the mark.)

Does the term "tough" instructor begin to have meaning? Does it begin to appear as though it may be necessary to have one? If not, let us read a final example of what might have happened to the student who forgot to fasten his safety belt. Here is a true story of what actually did happen to one such pilot.

He was flying at sea in an open cockpit biplane, when he decided to unfasten his safety belt. The pilot in the rear cockpit had never been thoroughly indoctrinated in the hazards of horseplay. He playfully pushed the stick forward and he did it so violently that it threw the front seat pilot clear of the plane. Although he cracked his chute and floated down, he had no rubber boat or sea dye and after the parachute sank it was impossible to locate him in the choppy sea.

Of course, something remains to be said regarding the student who is so apt that he requires little training, and for the student who is so sensitive that he responds to a slight curb better than to brisk treatment. For such students there is but one answer: hire the instructor who is a careful analyst but who also has the main characteristics of the "tough" instructor. Those characteristics comprise high standards of perfection, the severely critical attitude toward repetition of mistakes, willingness to wash out the bonehead blunderer. If he also has keen understanding of the student and student problems he is practically perfect.

This statement must not be interpreted as backing water. If the choice had to be made between an understanding man and a strict teacher the answer would be to take the strict teacher. The gain to the student would be far better in the long run, although the pain of instruction might be severe. But there would be no doubt as to the efficiency, ability, and safety of the product.

But remember this—a good flight instructor must be more than a teacher. He is an individual who is passing on to a student certain rules of flight; he must form lasting foundations of fundamental precepts that a student must remember all his life, basic traits that may some day save his life—and the lives of his passengers. END

FLYING

"Sprained his ankle getting out of the plane."

JET PROPULSION

uses SOLAR 'know-how' on world's fastest planes

SOLAR engine parts and Solar tailpipes are vital units in the miracle of Lockheed's "Shooting Star", that ghostly new jet-propelled fighter plane that rivals the speed of sound.

The selection of Solar to build important parts of jet engines is a natural result of Solar's fifteen years of experience in the handling of gases that were thought "too hot to handle"— in engineering and fabricating airplane exhaust systems and other products of high-temperature alloys to resist excessive heat, corrosion and vibration.

The miracle of speed is based on the miracle of skill!

SOLAR skills continue to solve problems in the elimination of hot gases, the utilization of waste heat energy, the control and transfer of heat and products of high corrosion resistance.

SOLAR AIRCRAFT COMPANY SAN DIEGO 12, CALIF. DES MOINES 5, IA.

while he's in uniform . . . AOPA is guarding his interests

MANY AOPA members, of course, are doing their flying right now for Uncle Sam . . . but they'll be back in private flying again—along with thousands more who never flew a plane before the war. While they are away AOPA is working hard to make sure that the future civilian aviation in America is built on a sound foundation. If you have soloed you are eligible for membership in this great national non-profit organization of plane owners and pilots. You are urged to join in AOPA's aggressive program to make private flying "safer, more enjoyable, and less expensive."

W. T. McKENNA, AOPA PILOT 8142, says of AOPA:

"We are thankful that we have at home such a trustworthy medium to transact, guard, and guide American aviation through these perilous times."

Many valuable AOPA services are FREE to our members

The Washington staff of AOPA will help you in personal flying problems, licenses, regulations, legal tangles, plane sales and purchases, documents, employment. You are also entitled to national AOPA-Hertz Drive-Ur-Self courtesy card with special rates; AOPA Washington Newsletter; each month the special AOPA edition of FLYING Magazine; TWA-AOPA courtesy card assuring service and maintenance facilities at most TWA airports; distinctive AOPA pilot's wings, emblems for your plane and car, and membership card.

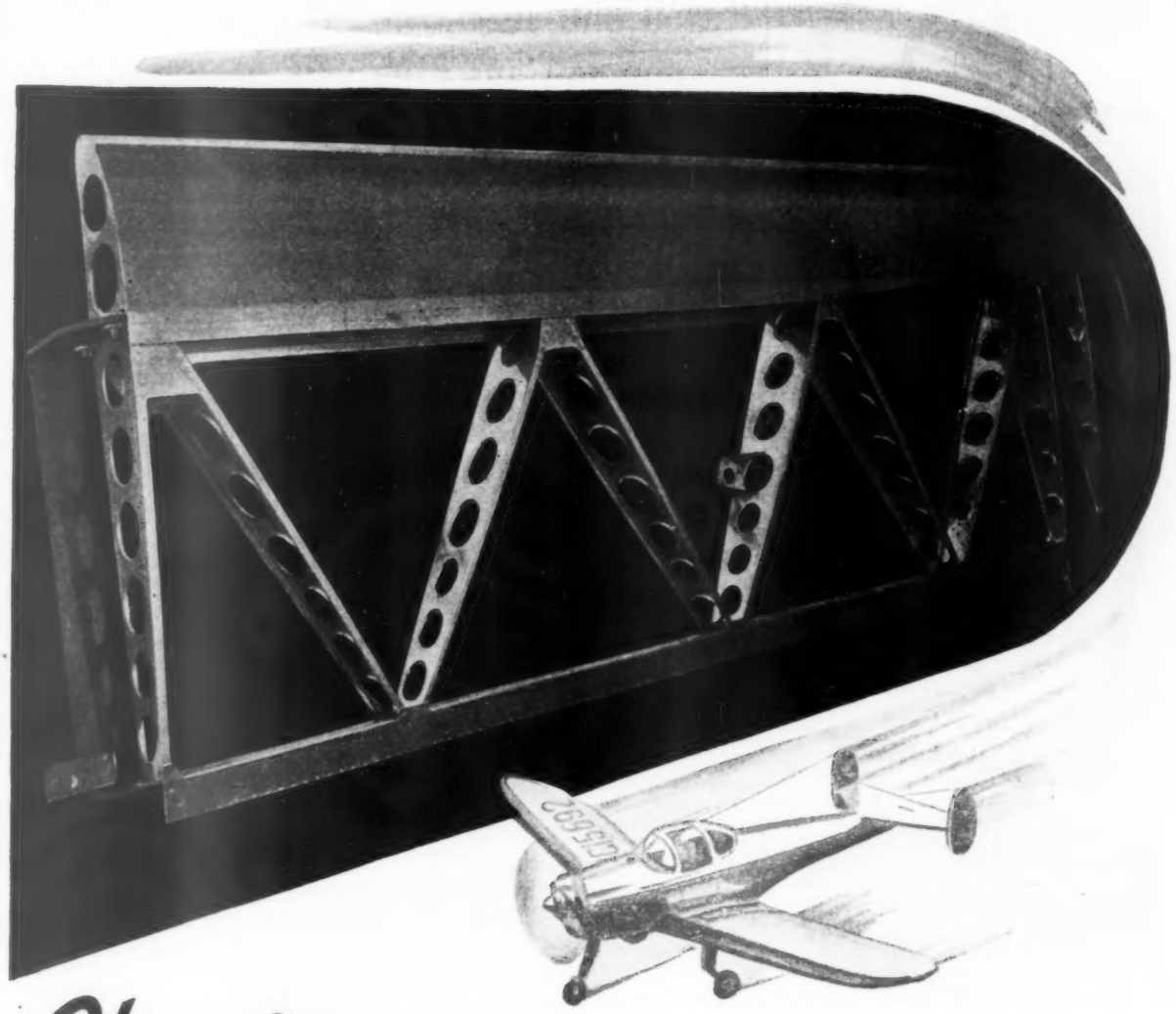
To join, simply use the coupon
Yearly membership dues, $5.00

AIRCRAFT OWNERS AND PILOTS ASSOC'ATION
National Headquarters, Dept. F645
1003 K Street NW
Washington, D. C.

I first soloed an airplane at.....in the year.....
I hereby apply for membership in AOPA.
Enclosed find check or money order for $5.00.

NAME.....
Please Print
ADDRESS.....
CITY & STATE.....
PILOT LICENSE NUMBER.....
SIGNATURE.....

"AOPA"
AIRCRAFT OWNERS AND PILOTS ASSOCIATION
NATIONAL HEADQUARTERS ✦ 1003 K STREET NW WASHINGTON 1, D. C.



Aluminum

FOR TRANSPORT—PLANE DEPENDABILITY

The trend in postwar personal planes is to metal construction. This Ercoupe aluminum wing structure is indicative of that trend. It permits higher factors of safety without adding weight, greater simplification, fewer parts, lower assembly costs.

It is logical that the warplane builders of today, having learned the inherent aerodynamic advantages of aluminum, will employ it generously in their postwar planes.

Alcoa's lightweight, high strength, corrosion resistant aluminum alloys are destined to give the flying public, personal planes with transport-plane dependability. ALUMINUM COMPANY OF AMERICA, 1815 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

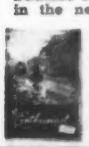
SKYLARK
AIRPLANE & PARTS CRAFTSMEN
SINCE 1934
Skylark Manufacturing Co., Inc., Venice, Calif.

NOTE:
Look to Skycraft
PRIVATE AIRPLANES
FOR BETTER SAFER POSTWAR TRANSPORTATION

"Believe Me, HARLEY-DAVIDSONS Are Tops!"

"In the Southwest Pacific"—writes Cpl. Frank S. L.—"I have charge of a number of Harley-Davidson 45's, and *believe me, they are tops.* Outside the usual maintenance, not one of them gives a moment's trouble. We are equipped to do 3rd and 4th echelon work or repair, but very seldom do we have to do it."

That's the kind of dependable performance for which Harley-Davidsons have *always* been famous, Cpl. Frank S. L. You and all your buddies can count on the same dependability in the new war-proved Harley-Davidsons you're going to ride in the happy motorcycling years after Victory!



HARLEY-DAVIDSON MOTOR CO.
Dept. F Milwaukee 1, Wisconsin
Write for free copy of ENTHUSIAST MAGAZINE.

HARLEY-DAVIDSON
MOTORCYCLES

Understand the Student

(*Continued from page 57*)

Frequently it's a problem of the student concentrating so hard on the angle of climb, for instance, that he forgets throttle setting or the need to perform any number of other important duties which are subconscious responses for the instructor.

All too often the instructor is inclined to "check ride" rather than give instruction. The majority of "front seat gorillas" prefer "Goddam it, your bank's getting too steep, you ignorant so-and-so" to "Now look, you're concentrating so hard on your nose that you aren't aware of your angle of bank. You've got to divide your attention."

Of course, if the student fails to improve and continually repeats the same old fundamental errors, the most patient instructor in the world can't keep calm—and isn't expected to. But too many instructors consciously or unconsciously consider every error made by a student as a personal insult.

Just how tough an instructor should get is always a problem. There are several different schools of thought. The generally accepted one, and the one which fits in with the traditional hard-boiled Army instructor type, is this: "Them no good ignorant so-and-so's won't do anything for you unless you ride the pants off them." This type of thinking is accompanied with harsh, tough language for all types of students regardless of temperament. It has ruined a lot of good pilot material.

There are many students who react naturally against rough treatment. I'm that type of person myself—and most of the students I've had in the past two years are the same way. They give me much better results when I work with them than against them.

Once in a while, however, you get a student who's lazy or persistently careless. Tough treatment is the only method of making him wake up. Even so, there seems to be little need for insulting remarks directed at the student.

Until recently the impression that the guy in the front seat is a gorilla was enhanced by the sound of his voice over the gosport system. The "cussport" in *Kaydets*, for instance, consisted of thin-walled aluminum tubing which picked up engine noises and made it impossible for an instructor to speak normally. By shouting at the top of his voice he could make himself heard but it made him sound mad. At Hawthorne Field, Orangeburg, S.C., we finally developed our own portable speaking system made from heavy rubber tubing which worked very well. Electrical intercom systems now have been installed in the PT's and you can speak into mouth mikes in practically a whisper. The psychological effect on the students has been much to the good.

One of the biggest wartime complaints I've heard from cadets concerns relations between themselves and their instructors. They dislike the constant state of uncertainty which exists throughout their flying-school days—especially at primary training. They claim, possibly correctly, that the constant strain is a serious handicap to proper learning. There is a plausible reason for this condition. The instructor, for his part, doesn't dare let a student feel too sure of himself. Obviously, the man in the front seat is confronted with one of life's most delicate pyschological problems. Take the case of a student who's definitely borderline. The instructor knows that it's only fair to let the student know he's weak. But he knows, too, that quite often a little encouragement will be just enough to get the weak one over the hump. How can both be accomplished on the same ride? That's only one reason why instructors should be psychologists.

In the above case, one thing is certain. Remarks such as "Whoin'ell ever told you you could fly?" only serve the purpose of letting off steam for the instructor—nothing more.

This "on the fence" attitude applies as well to good students. Let them think they're doing well and getting along all right and they'll start letting down—they'll quit practicing on their solo rides and all of a sudden they'll find themselves doing things on a check ride from which they may not recover.

Some students, by being too sensitive, magnify the gulf between themselves and their instructors more than is necessary. Some instructors appear aloof. In the Air Forces, the civilian instructor is considered an officer and the student an enlisted man. There is a necessary barrier between the two. But the most vital reason for aloofness between instructor and student is that close ties or established friendships can easily warp the instructor's better judgment when the student's elimination is in question.

This does not mean that the instructor and student shouldn't talk about subjects other than flying. On the contrary, the instructor should be encouraged to get to know as much about the student as possible. Quite often, if one learns where the student is from, his environment, interests and education, you may find out something about his mental make-up which will help to make a better pilot of him. Discreetly, an instructor should show a paternal interest in the student.

Some instructors, of course, are inclined to over-rate their positions. They are prone to treat their students with such scorn that the student is under so much nervous tension in the presence of his instructor that he isn't able to apply his entire attention to assimilating the instruction. I've seen lots of students heave a sigh of relief when, on reporting to the flight line, they've found they weren't scheduled for a dual ride.

The average flight instructor is not a nasty man nor is the aviation student always mistreated. There are plenty of things students do which deserve the hard-boiled opinions instructors express.

Here are some pointers on how to get along with an instructor:

First of all, you've got to show a real

Teach Aviation Preflight this new, modern way with the Penguin

PREFLIGHT CLASSROOM TRAINER

Equipped with CONVENTIONAL AIRCRAFT INSTRUMENTS AND CONTROLS

Penguin Preflight instruction is basic and thorough, thus making it possible for student to obtain Private Pilot's license in less than average time.

Daily Preflight instruction is now being offered to men and women at our Chicago School classrooms. If you live in the Chicago area you are cordially invited to stop in and see a demonstration of these Penguin Preflight Trainers.

Simulates All Attitudes of Flight

Penguin, the only practical training plane for teaching basic preflight is now available for classroom instruction. The plane is designed to assume all flight maneuvers; straight and level, climbs, glides, stalls and spins.

Camera projector placed on left wing of plane projects a silhouette on a panorama screen. The student, by the co-ordination of stick and rudder, is required to control projected silhouette along the charted lines of fundamental flight maneuvers. This teaches the student by visual observation to simulated ground and sky screen, the various attitudes of the aircraft in flight. Powered by fractional horsepower motor—propeller guard for added safety. Low Cost.

Write for information on prices and specifications.

PREFLIGHT SCHOOL *division*
Lewis School of Aeronautics
Dept. F-6, 235 S. Wabash Avenue, Chicago 4, Illinois

interest in flying and an earnest desire to learn. There never was an instructor and never will be one who won't work his goggles off for a student, no matter how poor, who wants to fly and is willing to work hard. But nothing is so aggravating as a listless, half-hearted one. I've graduated a few—regretfully.

Along with this eagerness should come a display of intelligence. By that, I don't mean college education, a flashy knowledge of physics, theory of flight or any other similar subject—just plain, ordinary, horse-sense and the ability to figure things out. Always remember that, regardless of how good your flying is, poor judgment on a ride rates a pink (failing) slip for the day's work. Judgment doesn't always mean trigger-fast thinking. It means good planning, getting your mind ahead of the airplane. Always know which way the wind's blowing, plan your flight over good country for forced landings, and don't spend all day getting ready to do maneuvers.

This may sound funny, but even your facial expression can be important. Whatever you do try to avoid a dead-pan expression when flying. Remember your instructor spends a lot of his time watching you in the mirror. Look intelligent and keep your mouth shut (both figuratively and literally). And fergawdsakes, when your instructor tells you something, acknowledge by nodding or indicate you didn't understand by appropriate expressions. Nothing will irritate him more than a failure to understand instruction accompanied by no request for repeat. On the ground, show a little interest by asking questions. No matter how good your instructor is he probably won't cover all the points—he's expecting you to ask questions.

Primarily, don't be careless about details. Here are a few irritating mistakes you can avoid: Keep your nose down in that first pattern turn; counteract for torque in the right climbs; don't lose altitude in clearing turns; don't wait a minute or two after clearing before doing a maneuver; don't forget to look at the tachometer frequently; visualize the pattern and don't let down over it.

In other words, do a little thinking and your instructor will soon realize you're human, too.

Getting fed up with teaching is the inevitable result of a long stretch of instruction in flying. The monotony and drudgery of this work will eventually beat down even the strongest-minded men. This has the inevitable effect of shortening an instructor's patience and making him less tolerant of small mistakes.

Any time I find myself getting touchy with my students I make it a point to stop and think that this seemingly small and insignificant instruction work is about the most important phase in giving future pilots the proper flying abilities.

No matter how provoked you may get with that guy in the rear seat, remember that he's human, too. END

The 'Black Widow' Boys

(*Continued from page* 34)

night fighter airmen have been turned out to date.

Hammer Field is the only AAF base where night fighter tactics are taught exclusively. Here, the three-man crews flying Northrop *Black Widows* are woven into teams which go through an entire tour of duty together, separated only by accident or enemy action.

Every pilot who goes to Hammer Field already has earned his wings and is commissioned either a second lieutenant or flight officer. Further, he has professed an ambition for night fighter work and has received additional training at Douglas, Ariz., in *Mitchell* transition bombers, taking an extensive course in instrument flying in these twin-engined aircraft.

When he arrives at Hammer Field, his flying training practically starts anew. In primary stage he is given more instrument flying in ground school and 20 hours in the air. He must reach a high degree of efficiency and have complete confidence in his P-61.

During primary training, pilots team up with their operators. They don't work with radar as a team during this period, because the pilot is too busy learning to fly. This is an extremely important time, however, for the pilot and radar operator. It is the time they are becoming close, inseparable friends and learning each other's flight habits. If the two don't get on too well together, they are diplomatically separated and teamed up with someone more companionable to each. The AAF and the Fourth Air Force have found that the closer the pilot and radar operator, the better chances they have to destroy the enemy and get back home safely.

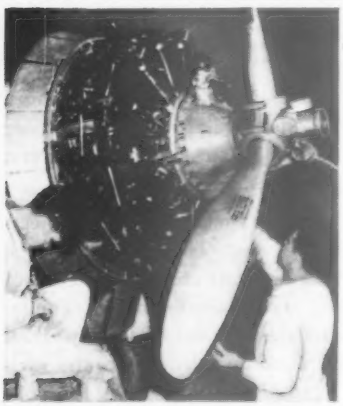
In the basic training phase, the pilot and RO are given several hours of dual instruction in modified Martin *Marauders* (TB-26), with a pilot instructor and radar operator instructor. The crews also fly tactical interception missions in *Black Widows*—both day and night—during this phase.

Advanced training ends their three month course at Hammer Field. During the advanced phase they learn high-and-low altitude night flying, advanced interception tactics, evasive maneuvers, closer co-ordination with GCI, and aerial gunnery at nearby Hayward Field. The fourth month of their course is in aerial gunnery, which is given at nearby Hayward Field, where training also includes skip bombing, ground gunnery, and so on.

Through all night fighter training the airmen learn the importance of their ability to see through the almost impenetrable blackness of the darkest night. Therefore they are thoroughly indoctrinated in night vision—a subject of vital interest even to the foot soldier. This course includes a simple description of the anatomy of the eye, the histology of the retina and the mechanics of vision. with emphasis on contrast between rods and cones, and central and peripheral vision. [Also see "Night Eyes for Airmen," FLYING, January, 1945.]

The human eye, the airmen are told, is made up of cells known as cones and rods. The cones comprise the exact, dark center of the eye and are used in daytime or in artificial light to focus directly on the object to be seen. The rods make up the outer ring of the eyeball and are responsible for night vision, with the object to be seen best discerned by looking about 15° above, below or on either side of it.

It takes from 30 to 40 minutes for the eyes to become thoroughly adapted to



Be a Licensed Engine or Airplane Mechanic in SIX MONTHS

All aviation repair stations must have licensed mechanics. Prepare now for your Engine or Airplane Mechanic's license at government-approved Roosevelt Aviation School. Ideally located for aeronautical training at historic Roosevelt Field. 16th year of unbroken operation.

You may qualify in 24 weeks for either license (issued by C.A.A.) if 18 or over when you complete the course—or for *both* licenses in 48 weeks. Put yourself in line for better ratings after induction or an immediate preferred job in commercial aviation if not needed by Uncle Sam. ***If you are a discharged veteran and desire to continue your education under the G.I. Bill consult us.***

NEXT ENGINE CLASSES BEGIN JULY 9 & SEPTEMBER 4
NEXT AIRPLANE CLASS BEGINS JULY 16

ROOSEVELT AVIATION SCHOOL
MINEOLA, LONG ISLAND, N. Y.
Phone Garden City 8000

Roosevelt Aviation School 6-45
Hangar 23, Mineola, L. I., N. Y.
I'd like to know how I can become a licensed Engine ☐ or Airplane ☐ Mechanic in six months or both ☐ in 48 weeks.
NAME..... AGE.....
ADDRESS .....

Photograph—Underwood-Stratton

"WEEMS" IS A NAME TO BE "RECKONED WITH", BY NAVIGATORS, EVERYWHERE

WEEMS INSTRUMENTS

DALTON COMPUTER, MARK VII.....$5.00

LYON COMPUTER (U.S. Geodetic Survey Type).....$3.00

WSN COURSE AND DISTANCE PROTRACTOR.....$5.00

LINK BUBBLE SEXTANT, complete with carrying case and spare bubble....$230.00

WARNER PLOTTER...$2.50

GILLMER COMPUTER.$3.00

If you could look inside the cramped quarters of a navigator on a U.S. bomber or transport plane these days, you'd notice that the name "WEEMS" was prominent on the navigation instruments and in the books used as navigational aids in flight. No wonder, for "Weems" instruments are standard in the U.S. Army Air Force, as well as in the Royal Canadian Air Force and the British Royal Air Force. In addition to the navigational instruments and texts Weems offers home study courses and classroom instruction in air navigation; in principal cities. Weems' texts and instruments may be purchased at the nearest aviation or marine supply house, or book store. If they cannot supply you, write to Weems System of Navigation, Dept. F-6, Annapolis, Maryland.

★ *Write for WEEMS new 1945 Catalogue* ★

WEEMS TEXTS

AIR NAVIGATION (Weems)..$3.50

ILLYNE STAR CHART..$1.00

LINE OF POSITION BOOK...$1.50

NAVIGATION NOTEBOOK AND PLOTTER (Weems)..$3.60

INSTRUMENT FLYING (Weems & Zweng).....$4.00

STAR ALTITUDE CURVES (Weems) Per 10° Lat. bond $5.00

LEARNING TO NAVIGATE...$2.00

DALTON E-6B COMPUTER

Leather case—23-page instruction booklet. (Standard with U.S. Air Force) **$10**

AIR WSN WEEMS SEA SYSTEM OF NAVIGATION

ANNAPOLIS MARYLAND

WEEMS AIRCRAFT PLOTTER—MARK II

Complete with instruction booklet. (Standard with United States Air Force) **$2**

SENSENICH

on LUSCOMBE

Approved as "standard equipment" by leading factory engineers and test pilots, Sensenich propellers may be depended upon for maximum performance. It's smart to insist on a Sensenich.

Prompt Repair Service Now Available

SENSENICH AIRCRAFT PROPELLERS

Adjacent to Lancaster Municipal Airport, Lancaster, Pennsylvania—West Coast Branch, Glendale, California

ATA

Now—A Resident Flight School for Young Women Exclusively

For you who want to make use of the modern method of personal transportation, the Alabama Institute of Aeronautics, the resident school for young women exclusively, offers you flight and ground school instruction to qualify you for your Private Pilot Rating in a 12 weeks' course. Experienced instructors have successfully trained military fliers since 1939.

Residence Halls and Dining Hall are conveniently located on the campus. The Institute bulletin provides complete information. A post card request will bring you your copy. Address

Walter P. Thorpe, Superintendent
Alabama Institute of Aeronautics
Tuscaloosa, Alabama

Alabama Institute of Aeronautics
165 Columbus Road, Tuscaloosa, Alabama

Be Sure to Build Popular Cleveland These Models

36", P-61 BLACK WIDOW. A C-D Industrial Training Model. C-D Kit T-155 ..... $1.50

Send 5c for Catalog

Mitchell B-25 Bomber 55", C-D Master Fly. ing Model Kit SF-125 $8.50

Mustang P-51 Span 26 3/16" C-D MFM Kit SF-91 $3.00

See your dealer first. If he can't supply you, order direct, including 20c extra for packing-postage.

CLEVELAND MODEL & SUPPLY CO.
4508E54 Lorain Ave. Cleveland 2, Ohio, U.S.A.

night vision. Therefore, those who fly at night are often seen wearing dark red-lensed goggles which help them to become dark-adapted long before the mission's start.

Once acquired, dark adaptation is zealously guarded by avoiding exposure of the eyes to brightly-illuminated areas. Cockpit lights in the *Black Widow* are turned so low that the instruments cannot be seen by a person not dark-adapted, yet the pilot can see them plainly! Caught in an enemy searchlight, or when he opens up all his guns at an enemy plane, the pilot quickly closes one eye to retain perfect vision in it, opening it only when he again is in complete darkness.

Windshields of the *Black Widow* have to be kept as clean as possible, while their crews are required to fly on oxygen from the ground up to help retain maximum night vision. Crew members also are urged to eat just before a flight, preferably something with sugar in it, as a low blood glucose level will lower night vision.

Thus, besides their flying and radar instruction, the students undergo a back-breaking course of study which includes altitude indoctrination and aviation medicine, special communications, special air defense, night aircraft recognition, meteorology, navigation, interceptor techniques, counter-measures to overcome and offset enemy radar, and many other subjects important in their new trade.

They know the astonishing advances that science has made in radar, both as an instrument to guide our weapons of war and as an aide to civilization in general after the peace.

They know, too, that civil aviation will benefit immeasurably by radar in a relatively short time—when the pilot of a huge airliner, for instance, will be able to fly through the darkest, rainiest night and come in for a perfect landing on a field he can't even see. A radar operator on the ground, who also can't see the plane, will have "talked it down" to a landing merely by reading the craft's position, range, altitude and speed on his radar scopes, relaying that information orally to the pilot. END

Letters

(*Continued from page* 80)

speed. Reduction of IAS is a method of reducing strain. If your air speed was not reduced below stalling speed you will not lose altitude but your ground speed will increase.

2. No. If glide speed maintained is 60 m.p.h., at 100 feet, the *ground* speed is 20 m.p.h. At 50 feet, ground speed would be 40 m.p.h., and the ground, 50 m.p.h. If this occurred during approach, your glide angle would have to change to hit the spot and still maintain 60 m.p.h. IAS.

3. It probably would, but not because of still air. Downdrafts are generally found on the lee side of the mountain which might cause loss of altitude, but not of air speed. Remember this: if you fly a plane at 65 m.p.h. in a 70 m.p.h. headwind you actually fly *backwards* over the ground at a rate of five m.p.h.—but you will not stall as long as you maintain your 65 m.p.h. air speed.—ED.

AMBULANCE PILOTS?

Sirs:

Regarding your article "The New Civil Air Regulations" by G. Sidney Stanton (March issue), I have every reason to cheer any reduction of existing CAA red tape and unnecessary regulations—but I did not expect such leaps and bounds. As a flight instructor (with 2,000 hours) who intends to follow aeronautics as a post-war career, my conclusion is that regulations such as "no minimum altitude over open country; aerobatics at any altitude or flight over an airport at any altitude in any direction" will solve the post-war employment situation for commercial pilots. We will easily obtain positions as ambulance pilots.

ENS. L. J. BOICE, USNR
Memphis, Tenn.

ASKS CAR REVISE

Sirs:

I, among other pilots, hope that the revisions of CAR will soon be in effect. Since I am only 17 years old I cannot secure my private license despite 100 logged hours of flight. My written test was passed nine months ago, but because I have not yet reached the 18-year mark, I cannot have a license to fly. In addition, I will probably have to go into service in mid-summer, before I will be 18 and it now looks like I have put forth all this effort for naught.

If a person 17 years of age has the required flight time, has passed the written tests, why can't he be granted at least a private license? My case, I believe, typifies that of other teen-age pilots. Can't something be done for us?

DAN MEANS
So. Charleston, W. Va.

L-PILOTS SHOT DOWN

Sirs:

In "The Sergeant Flies His Jeep" [FLYING, January] it was stated that no liaison plane has ever been shot down. This is not true, since we know of two L-pilots who have been downed through enemy fire—and many of us return with bullet holes in our "kites." Otherwise, your story was "on the beam."

T/SGTS. JOHN C. GALLAGHER
R. D. SNYDER, R. RUEHLEN;
S/SGT. BERNARD P. DOLE and
CPL. CLAUDE LACY
CBI Theater

● All the above NCO's have been awarded the Distinguished Flying Cross and Air Medal. Corporal Lacy wears the Purple Heart as well.—ED.

WHO'S TO BLAME?

Sirs:

I have just read "Before I Buy a Plane" in the February issue of FLYING and I think some of its propositions are debatable. The author blames manufacturers for fostering the attitude that people cannot be taught to fly in planes which fly themselves. But the operators are more

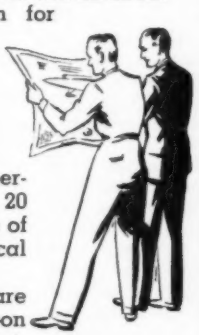
WILL YOUR AERONAUTICAL ENGINEERING CAREER Depend on LUCK OR LOGIC?

YOU can't depend on luck to bring you a good-paying position in aviation. You *must* have proper, thorough training at the *right school.*

That's why so many young men are coming to the Spartan College of Aeronautical Engineering. They are taking advantage of Spartan's superior specialized training that will qualify them for higher grades and ratings when called to military service . . . that will prepare them for a lifetime career in post-war aviation.

The training of engineers has dropped sharply during the war. It will be a long time before this gap can be filled. This is the field then, that offers you an opportunity for immediate employment and promotion.

If you are in the service you should ask us about our Provisional Enrollment Plan for Servicemen and the Servicemen's Priority List.



Thoroughly experienced and highly educated engineers are ready to instruct you at Spartan. Shop courses are taught by instructors with U. S. Government certificates in their subjects. In 20 months you can earn your degree of Associate in Arts in Aeronautical Engineering.

Select the course in which you are interested by checking the coupon below. Mail it for new 64-page catalog.

(Above) the Spartan Engineering Building—the most modern to be found at any aviation school in the country, and just one of the 29 buildings that dot the 50-acre Spartan campus.

SPARTAN SCHOOL OF AERONAUTICS
DIVISION OF SPARTAN AIRCRAFT COMPANY

and COLLEGE OF AERONAUTICAL ENGINEERING
DIVISION OF SPARTAN SCHOOL OF AERONAUTICS

SPARTAN SCHOOL OF AERONAUTICS—Capt. Maxwell W. Balfour, Director
Address Dept. F-65, Tulsa, Oklahoma

Send me your new Catalog, describing in detail the **SPARTAN** courses I have checked, also stating tuition and living expenses.

Name ..... Age .....
Address .....
City ..... State .....
Previous Education .....
Are You a Veteran? ..... In the Armed Forces? .....

CHECK COURSES YOU PREFER

- ☐ Aeronautical Engineering
- ☐ Airline Maintenance Engineering
- ☐ Commercial Pilot
- ☐ Commercial Flight Instructor
- ☐ Airline Service Mechanic (A&E)
- ☐ Instrument Technician
- ☐ Link Instructor
- ☐ Airline Pilot
- ☐ Fixed Base Operator-Pilot
- ☐ Aircraft or Engine Mechanic
- ☐ Radio Operator
- ☐ Private Pilot
- ☐ Weather Forecasting
- ☐ Women's Instrument Technician
- ☐ Parachute Rigger

Memo to √ Aircraft Engineers √ Ground Crew √ Mechanics

If you are charged with the responsibility of production maintenance or repair work, you should have this thoroughly comprehensive, complete manual and technical reference guide . . . Aircraft Mechanics Handbook. Represents all branches of aircraft mechanics and materials dealing with the entire air-frame. Has quick-reference tables, charts, mathematics, installation instruction, aircraft nomenclature (both civil and military). There are more than 260 drawings. 10 classified sections, 400 pages indexed, with flexible cloth binding. This Aircraft Mechanics Handbook is a "working tool" compiled into understandable form by practicing craftsmen. Clip Coupon below and mail TODAY! Be sure to state book name.

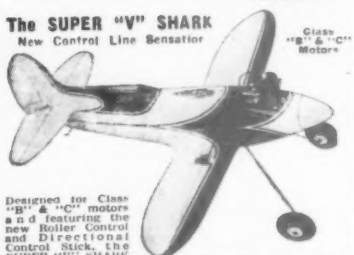
ONLY $2.75 Postpaid When accompanied by remittance.

Aircraft Sheet Metalwork by J. W. Giachino—
Lt. USNR, NATTC.
(Part ONE—Basic Information).....$2.50
(Part TWO—Blueprints).....1.75
THE MANUAL ARTS PRESS, PEORIA 3, ILLINOIS

MANUAL ARTS PRESS,
220 Duroc Bldg., Peoria 3, Ill.
I am enclosing $_____ Send me at once
(name of book or books)_____
My Name _____
Address _____
Town _____ State _____

SUPER G-LINE MODELS
Now Available

The SUPER "V" SHARK
New Control Line Sensation

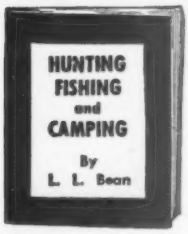


Class "B" & "C" Motors

Designed for Class "B" & "C" motors and featuring the new Roller Control and Directional Control Stick, the SUPER "V" SHARK flies at speeds up to 120 M.P.H. with unusual stability and ease of control. The CONSTRUCTION KIT, complete to the finest detail, is now available at only $4.95, Plus 30c Postage
Descriptive Literature 5c

VICTOR STANZEL & CO., Dept. F., SCHULENBURG, TEXAS
First In Control Line Flying

Bean's Improved, Revised Book on How to Hunt, Fish and Camp



Mr. Bean's many years of varied experiences have proved invaluable to countless sportsmen. Definite, usable information for making your trips safer, successful and enjoyable. 43 chapters, 116 illustrations, exceptionally good paper, cloth bound, 108 pages including memorandum pages for making notes on 10 outing trips.

Send for 16 page prospectus

Price $1.00 Postpaid anywhere in United States or Canada.

L. L. Bean, Inc., Freeport 224, Maine
Mfrs. Fishing and Camping Specialties

AERONAUTICAL UNIVERSITY B.S. DEGREE IN 2 YEARS

FOUNDED BY CURTISS-WRIGHT

Prepare for key positions in Aeronautical Engineering, Drafting and Engine Mechanics. Pre-flight and short, intensive training and degree courses lay foundation for advancement in the growing field of aviation.

Veterans welcome. Day and evening classes. Send for free illustrated booklet — "Opportunities in Aviation."

Dept. 2, 116 South Michigan Ave.
Chicago 3, Illinois.

to blame. Airport operators believe they gain more in instruction fees from planes difficult to fly, since they require more dual instruction. However, such planes cut down aircraft sales.

Need for faster lightplanes, plus all the talk about roadable planes, will bring development along these lines. In spite of more and more flight strips and airparks being constructed, Mr. Geisse wants an airplane with the back seat convertible into a bed. Today people are becoming more interested in what's under the hood and floorboard than in a fancy array of gadgets and geegaws—or seats folded into a bed.

CPL. RICHARD H. ADAMS
APO, New York, N. Y.

CLOUDS

Sirs:

On page 65 of the April issue of FLYING the topic, "Know Your Clouds" was very helpful to us, however, one item was apparently in error. You have referred to an altocumulus type cloud as a "mackerel sky" whereas they are connected with a cirrocumulus cloud formation.

W. B. BARROWS, S1/C
Chief Airport Traffic Controller
R. MICHAEL CHANDLER
Observer, USWB
Augusta, Me.

● Investigation and reports from the local U. S. Weather Bureau indicated reference to either altocumulus or cirrocumulus clouds in rippled layer form as a mackerel sky. International Code Classification of Clouds and States of the Sky says that true cirrocumulus clouds are rare. Mackerel sky implies a form of cloud, not a type of cloud.—ED.

BOUQUET FOR HUBLER

Sirs:

I wonder if you know that in the March issue of FLYING you published the best story that has yet been written about combat flyers of this war. "A Story of Five Pilots" by Richard Hubler is so good and the feeling behind it so accurate that it may be quite meaningless to non-combat flyers.

Because I have just returned from the Philippines where I served with a fighter squadron, I know how it was. Hubler knows too.

A LIEUTENANT, USMCR
Brooklyn, N. Y.

WANTS JET DATA

Sirs:

I have not noticed any books on Jet-Propelled engines or gas-turbine engines reviewed in your interesting column, "The Library." Can you provide me with any list of such books?

HIROKA SASAKI
Newell, Calif.

● Much of this data is still classified as "security," and little authoritative material has been compiled. Recent Library reviews in FLYING included two books, *Rockets* and *Rocket Research*. See also *Gas Turbines and Jet Propulsion*, by G. Geoffrey Smith. END

Your Post-War Job in Aviation

(*Continued from page* 28)

added together, are operated with routines similar to the airlines and staffed to a large extent with airline men. The natural result of this situation will be that men from these two particular branches of the services will have the best chance for any of the comparatively few openings.

PRIVATE FLYING: Of our present 20 billion-dollar aviation manufacturing industry, some persons say we will be fortunate to retain two per cent of that operating total in peacetime. Even that would be a $400,000,000 annual industry employing 50,000 individuals. J. A. Krug, chairman of the WPB, estimates that from five to 10 per cent of today's industry will survive.

Manufacture of private planes will comprise the major portion of our post-war aviation industry. Although it would be valuable to know how many private planes will be bought and used, this number can only be estimated. Predictions of the number of private planes within five to 10 years after the war range from 25,000 by the National Research Planning Board, to 450,000 by William A. M. Burden, assistant Secretary of Commerce. Combining these two predictions with five others and obtaining their average, it is indicated there will be 210,700 planes in that period, or eight times as many planes as we had in 1941 [also see "There's a Prediction For It," FLYING, March, 1945].

Of two important variables in the picture, one is the helicopter which is developing fast. Will it suddenly become practicable for general private use and at a price which many can afford? Or is it five to 10 years away from that goal, as many say today? The second variable is the possibility of an entirely new kind of plane, so useful that it will be manufactured in quantity and sold at a popular price.

We can estimate this potential employment by examining the market. Who will buy airplanes? Here are some of the possible purchasers:

Two and a half million men now in the air forces, 300,000 of them pilots.

Two and a half million men and women now working in the aviation industry.

Several hundred thousand young men and women now at flying schools who have come of flying age since the war started and only now are able to get instruction.

Sixteen million older men and women—40 to 50 years of age—daily reading about the ease of flying new planes and the "air age." Several hundred thousands of persons who learned to fly between 1927 and 1941 and have been unable to keep it up for financial reasons but who might now buy an inexpensive airplane.

AIRPORTS: The National Airport Plan.

Classified Advertising

RATE: 8c PER WORD FIRST 15 WORDS $1.00

AVIATION EQUIPMENT

AI-DEE III. An outstanding small, inexpensive, hand held, pack type serial camera for private flyers. Write Aero Devices, 5134 W. Madison St., Chicago 44, Ill.

NAVY Navigation Computer—easy instructions. $1.00. Army D-4 Computer-instructions, $2.00. E-6B Army Computer—leather case—booklet, $10.00. Weems Plotter, $2.00. Army-Link Bubble Sextant, $230.00. Special pad Navigation Plotting Sheets, 60c. Course Computation Forms, pad, 50c. Northwest Distributor for Weems. Dealers invited. Merrell Aviation Ground School, 1413 25th Ave. North, Seattle 2, Wash.

PILOT Jackets, limited quantity, new B3 Army type (sheep skin lined) zippered, $32.95; A3 Army type trousers (sheep skin lined) zippered, $40.00; B2 Army type leather visor caps (sheep skin lined), $3.75; A10 Army-Navy type Gauntlet, goatskin one finger mitten type (baby lamb lined), $12.50; A6 Army type Boots (sheep skin lined) zippered, $16.95. State size. Flying Equipment Sales Co., 1643 Wolfram St., Chicago 13, Ill.

FLYING Caps, Nationally known "Sun Dodger" khaki twill, long visor, $1.15. A2 Army type, Flight Jackets, dark brown leather (cloth lined) zippered, elastic-knit waistband and cuffs, $18.75; same jacket in goatskin, $21.75. DeLuxe olive green Army-Navy type Flying Suit, wool gabardine, zippered, $25.00, or same suit in O.D. twill, $18.75. Army regulation Field Jacket, khaki poplin (cloth lined), $8.50; (wool lined), $9.50. Army raincoats, $6.00. State size. Flying Equipment Sales Co., 1641 W. Wolfram St., Chicago 13, Ill.

AIR CORPS Squadron Insignias; for collectors and made to order. Prices and details, 10c. Hobbyguild, G-35 West 32nd St., New York.

LOOK—24-Hour Watch Dials fit any watch. 1 minute to apply. 15c each—2 for 25c. Send cash to Aviation Enterprises, Dept. 1, P. O. Box 671, Gallup, N. Mex.

AVIATION SUPPLIES

NEW TIRES: Factory Stocks—Our Specials 6:00x6 non-skid, 7:00x4, 8:00x4 Strictly first, 4-ply, $11.75. Tubes, $3.25. All sizes stocked 6:50x10, 7:50x10, 8:50x10 regular. 8:00-10.00 Smooth Contour Tailwheels, 6x2 solid tailwheels, $1.45. Lowest prices. Immediate deliveries. New reliable merchandise, Sensenich Propellers. B.G. & Champion Spark Plugs. Storage Batteries. Shockcord Rings. Windshield Pyralin. Scott Tailwheel Assemblies. Bob Trader Aero Supply, Municipal Airport, Pittsburgh, Pa.

FLYING Caps, khaki twill, $1.25 each; dozen lots discount 25%. Plenty dopes, fabric, parts, supplies. Aero Parts Supply, Municipal Airport, Houston, Texas.

SPECIAL while they last. Irvin Seat Pack Parachutes. Like new. Repacked day of shipment. 24 or 28 ft. Silk. Satisfaction guaranteed or your money refunded. Cash or check with money order. Sent prepaid. $50.00. Parachute carrying bags, $5.00. Donnell Aviation Supply, Box 451, Dallas, Texas.

AIRPLANES FOR SALE

GOVERNMENT war surplus airplanes now being sold. Do you know where to buy? List of over 70 Government Agencies, Sales Centers and Depots for $1.50. Surplus, Box 544, Denver, Colo.

N-B LOW Wing Monoplane, $150.00 complete; light plane motors as low as $45.00 complete with propeller. Send 25c for new Spring War-Bargain catalogue just out listing hundreds of bargains in airplanes, motors, crackups, salvage, surplus, located everywhere, some probably near you. (35c by first class mail.) Used Aircraft Directory. Athens, Ohio.

PROMPT Service on New 1945 Model Motors and Gas Model Airplane Kits. Buccaneer B Special, $3.95; Buccaneer C Special, $6.95; Berkeley Controliner U-Control, $5.95; Miss Be Have U-Control Kit, $3.95; Ercoupe 48" freeflight or U-Control Kit, ready to assemble, $12.50; Clark-Williams V-G U-Control, $10.00; Flo Torque Props: X-Cell props; Batteries and Speed Props. We stock all the known gas kits now on the market. Stock for immediate shipment. May Silver King Rocket or Victor Model, $22.50; Atwood and Bullet motors; Distributors for Cannon and Barker motor, Champion Spark Plugs, Dopes. We repair motors; Forster parts on hand, Forster rear Crankcases, sandcast, $1.65. We ship APO addresses. Send 10c for our 32 page catalogue and list. On orders include 15% extra for postage and insurance. Holcomb Pharmacy Model Shop, Don D. Holcomb, Phone 37, Alma, Kansas.

AIRPLANES — USED — Bargains at give-a-way prices. Ready to fly. Don't buy that airplane or equipment until you have consulted our latest listing. You may save yourself a fortune. Send 20c to cover mailing. Aero-Trader, Adams 2, Mass.

AIRPLANES WANTED

PIPER, Luscombe or Taylorcraft, 2-3 place cabin in good condition, 65-75 horsepower. E. A. Iverson, 544 W. Washington Blvd., Chicago 6, Ill.

WANTED: Rose Parakeet any condition or C3 Aeronca. Box 258, % Flying.

INSTRUCTION

QUIZ Yourself before writing CAA private pilots' examination. Our typical multiple choice questions on Navigation, Meteorology, CAR and General Service will help you pass. Complete with answer key, only $1.00 postpaid. Wisconsin Aeronautical Institute, 1522B Flett, Racine, Wis.

METEOROLOGY — Navigation — General Servicing Simplified. New — Quick — Different. Veteran instructor's proved easy method by correspondence. Pay as you learn. Constant supervision. Write for particulars. Michigan School of Aviation, Detroit City Airport, Detroit 5, Mich.

BUILD your own BG 6 Utility or BG 8 Two-place Sailplane from government certificated plans. Send 10 cents for illustrated circular Briegleb Aircraft Company, Van Nuys, Calif.

PASS your CAA Examinations—Here is just what you may have been looking for: our multiple choice examinations. This is not another book, but a collection of genuine examinations used in CAA-CPT-WTS programs. Complete set, $1.00 postpaid. Supply limited. Aero-Trade Service, Adams, Mass.

STUDENT Pilots—Prepare for the CAA written examination in your own home, under the supervision of a certificated instructor. Our thorough home study training eliminates the dry stuff in ground work. It will not cost you a fortune either. You need no longer deny yourself the benefit of competent ground instruction. We make it easy for you. Free particulars. Aeronautical Trade Institute, Dept. Bfg., Adams, Mass.

BOOKS

METEOROLOGY — Navigation — General Servicing Simplified. New—Quick—Different. Veteran instructor's proved easy method by correspondence. Pay as you learn. Constant supervision. Write for particulars. Michigan School of Aviation, Detroit City Airport, Detroit 5, Mich.

CIVILIAN Flying opening up! "Operating A Flying Club" tells how to start a good paying business without capital. How to expand; get business; where to buy Government surplus Airplanes for little cash. Valuable trade secrets! Author formerly with CAA. $1.00 brings your copy by return mail. Satisfaction guaranteed. Merritt Wells Pub. Co., Gladstone, N. J.

WANTED! Pilots in Alaska! Here is the inside information on the current flying situation in Alaska, prepared by an Alaskan pilot. Contents include addresses of airlines in Alaska and other good flying contacts. There is a need for pilots. Get in before it is too late. Send 50c for your copy of this interesting pamphlet now to Box 455, Flushing, N. Y.

QUALIFY as Airplane & Engine Mechanic, 1945 texts prepare you for A & E rating (license) exam. Covers all phases required mechanical work, diagrams and latest Civil Air Regulations. Author holds A & E Certificate plus Aeronautical Engineering Degree. Aircraft Text, $1.50. Engine Text, $1.50. Combination, $2.50. Postpaid or C.O.D. Flight Press, Box 101-A, Edwardsville, Illinois.

MAGAZINES (back dated)—foreign, domestic, arts. Books, booklets, subscriptions, pin-ups, etc. Catalog 10c (refunded). Cicerone's, 863 First Ave., New York 17, N. Y.

FLIGHT Instructor, with new "Multiple Choice Typical Examinations." Load Factor problems with solutions. Important information you must know. Only $3.00, postpaid or C.O.D. Quiz System, 12021 Ventura Blvd., N. Hollywood, Calif.

GROUND Instructors. At last, what you have needed. These three books prepare you for all ratings: "Ground Instructor," a basic text, $3.00. "Ground Instructor Rating," all in multiple choice form, necessary to prepare you for the government test, $3.00. "Air Navigation Note Book" with Dept. of Commerce Navigation Plotter DeLuxe, $4.00. Quiz System, 12021 Ventura Blvd., N. Hollywood, Calif.

24 ISSUES only 50c. Hundreds airplane bargains, parts, news, etc. Aviation Advertiser, 8242 Travelair, Houston, Texas.

AIRCRAFT & ENGINE MECHANIC MANUAL—just off the press—contains typical new examinations. Prepare for your rating. Only $3.00, postpaid or C.O.D. Quiz System, 12021 Ventura Blvd., N. Hollywood, Calif.

AIRLINE Transport Pilot Rating, by Zweng; a new book, first of its kind—prepares applicants for Airline Transport Pilot Rating. Typical Examinations included. $4.00 postpaid or C.O.D., Pan American Navigation Service, Dept. F-C, 12021 Ventura Blvd., N. Hollywood, Calif.

METEOROLOGY. This important subject fully covered in "Ground Instructor," by Charles A. Zweng. Basic text with original "Quiz Method" now used in leading Aeronautical Schools. A complete section on Navigation and General Aeronautics included. Only $3.00 postpaid or C.O.D. Pan American Navigation Service, Dept. F-C, 12021 Ventura Blvd., N. Hollywood, Calif.

"100,000 POST - WAR JOBS ABROAD" — South America, Asia, Africa. How, When and Where to Apply. 15,000-word, copyrighted forecast—$1.00. Return for refund in 7 days if not satisfied. Pacific Industrial Research Bureau, 202-J Studio Building, Portland 5, Oregon.

CORRESPONDENCE Courses and self-instruction books, slightly used. Sold, rented, exchanged. All subjects. Satisfaction guaranteed. Cash paid for used courses. Complete information and 92-page illustrated bargain catalog FREE. Write—Nelson Company, Dept. 2-17, Chicago 4, Ill.

"AIRCRAFT Hydraulic Systems," by E. W. McDonough. Design-Theory-Operation. A specialized branch of aeronautics for students, mechanics, engineers, draftsmen, training schools. Testing and maintenance of commercial and military hydraulic installations treated fully. $2.50. Aircraft Specialties, 134 So. Waller Ave., Chicago 44, Illinois.

STUDENTS—of Aircraft and Engine Mechanics preparing for CAA licenses. A new book "Aero Mechanic's Questionnaire" is now available. 2,000 multiple-choice questions on: Sheet Metal, Welding, Hydraulics, Rigging, Aerodynamics, Wood Fabric, Dopeing; Propellers; Ignition, Lubrication; Carburetion; Power Plants; Civil Air Regulations. 200 questions on each of these ten subjects. Each question with five alternate answers. Answer keys included. $3.00 postpaid. C.O.D. slightly higher. Paxon Publications, 224 Maine, Lawrence, Kans.

COMMERCIAL and Private Pilots. New typical "Multiple Choice" examinations are included in "Aeronautical Training" just published; only $3.00 postpaid or C.O.D. Quiz System, 12021 Ventura Blvd., N. Hollywood, Calif.

SITUATIONS WANTED

COMMERCIAL Pilot (O-2430 h.p.) wants position with company in North or Canada. R. L. Neate, 161 Palmer, Kenmore 17, N. Y.

FORMER Airline Pilot Desires position as pilot or in operational capacity. Ten years airline experience all phases. Two years manufacturing experience as chief test pilot. Box 260, % Flying.

PILOT—Commercial license, instrument and instructor rating. Zero to 6000 horse power, single and multi engine. Over 1000 hours accident free flying. Prefer charter or staff pilot's job. Write Box 261, % Flying.

HONORABLY discharged Flying Officer, 21, 280 flying hours, 2 years college, desires permanent position with Aircraft firm as representative, agent or any position involving post-war aviation sales, or management. Residence in New York City. Box 262, % Flying.

NAVY trained pilot and officer, 16 years' experience, desires permanent aviation position as pilot, instructor, ground school, management, research, engine design or operations. R. N. Latimer, 236 40th North, Seattle 2, Wash.

MISCELLANEOUS

WANTED: Addresses of persons interested in investing in small, but profitable airport. Backers for coming air age business. Box 207, Oak Hill, W. Va.

TYPEWRITER Repairing—Original Course—Simplified Home Study. Weber Typewriter Mechanics School, Box 269, Osborn, Ohio.

UNIVERSAL Midget Aircraft ¼" Socket Set. Dandy 18 piece set: 8 sockets—7/32" to 7/16", Spintype Handle, Sliding T Bar Handle, Reversible Ratchet, Midget Crescent wrench, 4 Midget Open End Wrenches, 1 Midget Screwholder, $19.85. Order this new Aviation mechanics set now! Immediate shipment: Overnight by air to anywhere USA! Universal Tool Company, O. B. Dematteis, President, 1527 Grand F, Kansas City, Mo.

WANTED, to hear from aviators, also from owners of 1903 to 1930 airplanes. Casimer Pawlak, 3799 E. 54th St., Cleveland 5, Ohio.

HOW to Finance Any Business: Obtain Capital. Research, 208A Lenox, Duluth, Minn.

YOUR name cleverly drawn in Cartoon, $1. State hobby or profession. Holt Scott, Box 126, Somerville, Tenn.

SUPERWAX preserves, waterproofs canvas, rope, leather. Waxes skis. Finishes wood. Prevents rust. 1½ pounds (Gallon size), $1.00 postpaid. Superwax Co., Box 1492-F, Milwaukee 1, Wis.

MIDGET Car, $20 less motor; Motorbikes, $35.00 up, complete; Servicycle, $25, less motor; complete motorscooters, $40 up. Briggs-Stratton, Lauson, Maytag motors, several as low as $5. Unrationed balloon tires, $1.75 up. Mail order only. Send 25c for Big War-Bargain catalogue No. 7, containing hundreds of bargains in Motorbikes, Motorscooters, Midget Cars, Tires, Parts, Plans, etc. (35c by first class mail.) Midget Motors Directory, Athens, Ohio.

ANYONE knowing the whereabouts of Edward Emig, one time employee of Funk Airplane Corp., please notify Box 259, c/o Flying.

AERO Cameras for sale: Folmer Graflex K-5 and K-10 with original lenses, $275 each. Guaranteed. H. Stern, 872 Sixth Ave., New York, N. Y.

BEAUTIFUL airline baggage stickers, 7 different, 25c; 20—$1.00; 32—$2.00. E. Smith, Dept. FL, 45 E. Banks, Chicago 10, Ill.

WANTED: Engineers, interested in becoming affiliated with national engineering service organization as consultants. For information write United Engineers, Inc., Box 1065-B, Los Angeles 28, Calif.

HAVING Car Trouble? Used, guaranteed auto truck parts. Save money. Transmission specialists. Describe needs; immediate reply. Victory, 2439L Gunnison, Chicago 25.

EVERY Picture An Enlargement. 8 sparkling deckle-edge Enlargements and roll developed 25c coin; 116 size or smaller; enlarge reprints 3c. Enlarge Photo, Box 791N, Boston, Mass.

WANTED—MISCELLANEOUS

WATCHES Wanted—Broken or usable—all kinds, even Ingersolls. Highest prices paid for jewelry, rings, spectacles, alarm clocks, razors, cigarette lighters, gold teeth, etc. Cash mailed promptly. Lowe's, Holland Building, St. Louis 1, Mo.

PATENTS

PATENT Particulars and Blanks Free: Sterling Buck, F, 637 North Ave., Baltimore 17, Md. Government-Registered Patent Attorney 37 years.

PATENT your Good Ideas! Send me your simple sketch or model. Free confidential advice—literature. Z. Polachek, Registered Patent Attorney-Engineer, 1234 Broadway, New York City.

PATENT Protection. Information and Invention Record Free. Randolph & Beavers, 372 Columbian Bldg., Washington, D. C.

PATENTS Secured. Two valuable booklets sent free. Write immediately. Victor J. Evans & Co., 948-F Merlin Bldg., Washington 6, D. C.

GLIDERS

BLUE PRINTS AVAILABLE

• Utility Trainer • Primary Glider • Soaring Glider

SINGLE and TWO-PLACE

FREE 3-View Pictures; Gov't. Surplus Salvage Materials Available. What Are Your Needs? Prompt Service.

California Aero Glider Co., Dept. F-6
1829 West 62nd St., Los Angeles 44, Calif.

STAMMER?

This new 128-page book, "Stammering, Its Cause and Correction," describes the Bogue Unit Method for scientific correction of stammering and stuttering—successful for 44 years. *Free—no obligation.*

GET THIS FREE BOOK!

Benjamin N. Bogue, Dept. 5255 Circle Tower, Indianapolis 4, Ind.

drawn up by the CAA and now being considered by Congress, would double the number of airports (from 3,000 to 6,000) with 90 per cent of the increase being the smaller fields for private flyers. The plan, financed in part by Federal funds, would provide suitable airports for all towns and cities as well as a tremendous and lasting stimulant to the entire aviation industry.

The report estimates these new fields will produce 63,000 operational jobs with 125,550 more jobs resulting from the total of 6,305 fields. At the average airport —used by transport services—200 men are usually employed in jobs ranging from airport manager down through the waiter in the airport restaurant and the man who keeps the grounds clean. At smaller airports the estimate of jobs is 10 per field.

Airport management and maintenance has new importance in the aviation employment picture. The old, slipshod methods can no longer survive. Airports must adopt business principles comparable to those in older and established businesses. Cities will need airport managers and fixed-base operators will need pilots and mechanics.

CAA Jobs: Many pilots in service have inquired about flying jobs with the CAA after the war. Although the CAA is certain to expand as flying increases, it will take back its own men in service first, and, further, there are very few flying jobs in the CAA. Those few require pilots of exceptional skill and many years of experience on a wide variety of planes. Employment possibilities as pilot with the CAA are so small as to be negligible, at least for several years.

It should be remembered that the CAA cannot operate as an employment agency and that no service man can safely make any definite job commitment until the date of his discharge is certain. When the time comes, the CAA will give its full co-operation to the Veteran's Bureau, all branches of aviation, and to individuals to help them get located in the aviation work they wish to do.

Financial aid for the start of an aviation business (or other business) will be available under the "G. I. Bill of Rights." Details should be obtained from regular service sources.

Airways jobs, from engineering to maintenance, will be available with the CAA's communications, air traffic control and maintenance. Men will be needed as the airways are expanded after the war. Today there are 37,000 miles of airways in the U.S. and 8,000 miles of airways in Alaska, with the CAA Airways Service employing 6,500 persons. This number may be expected to double if anticipated flying increases materialize. Men with military experience in air traffic control, communications, weather, signals—either operation or maintenance—logically would be potential CAA employees.

The desire of the aviation industry in general to offer jobs to veterans and others who plan a career in aviation must be considered with the understanding that the industry cannot possibly maintain employment approaching the present level after the war ends. However, thousands, including many women, will withdraw from work; thousands more will go back to their own true trade which has been eliminated during war; manufacturers of many civilian commodities which are almost extinct at present will siphon off other thousands. As always, a man with ability, ingenuity, good judgment and ambition will find his natural place in the work for which he is best fitted. END

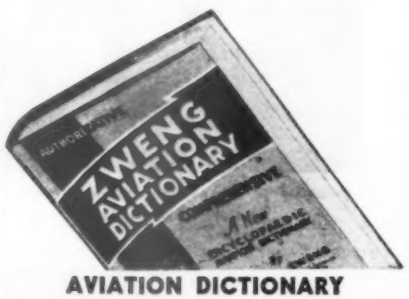
PHOTO CREDITS

The following list shows the source from which pictures used in this issue were gathered. Where a single page is indebted to several sources, credit is recorded left to right, top to bottom.

4—WACO
21, 22—AAF
23—HAL MORRIS
24, 25—AAF
26—USN
27—INS, CAA, ACME
28—ACME, A. C. TURNER, U. S. FOREST SERVICE
29—CAA
30—ACME
31—JULIAN KRUPA
32, 33—AAF
34—AAF, SPERRY, THE AEROPLANE
35-42—ARTHUR HAUG
43—U. S. SIGNAL CORPS
44, 45—AAF
46—CAA
47—INS
48-51—USN
52—U. S. WEATHER BUREAU
54—RALPH MORGAN, USN
55—DOUGLAS, ACME
56—RYAN
57—CAA
58—BRITISH OFFICIAL
59, 60—REYNOLD BROWN
61, 62—CURTISS-WRIGHT
63—AAF
64—USN
66—HANS GROENHOFF
68—CHARLES E. BROWN
70—AAF
73—LOCKHEED, AAF, CONSOLIDATED VULTEE, INS, CHARLES E. BROWN
74—RYAN, USN, CONSOLIDATED VULTEE, CHRISLEA, BRITISH OFFICIAL, FLYING, ACME, BRITISH OFFICIAL
75—USN, W. EUGENE SMITH, USN, AAF, CURTISS-WRIGHT, USMC, CURTISS-WRIGHT, BRITISH OFFICIAL
76—AAF, USN, BRITISH OFFICIAL, CONSOLIDATED VULTEE, AAF, BRITISH OFFICIAL, CHARLES E. BROWN, AAF, AAF
77—STINSON
78—"SOL" ELLUTSON
80—CAA
94—LOCKHEED
96, 108—AAF
116—NORTH AMERICAN, PAUL FOUNTAIN
123—USN
134—TWA
136—DOUGLAS

INDEX OF Advertisers JUNE 1945

COMPANY	AGENCY	PAGE No.
Aerial Products Inc	James J. McMahon, Inc	12
Aeronautical Products, Inc	Howard D. Steere Advertising	125
Aeronautical University	N. W. Ayer & Son, Inc	150
Aeronca Aircraft Corporation	The Ralph H. Jones Co	79
Aeroproducts Division, General Motors Corporation	Kircher, Lytle, Halton & Collett	Color Section
Aircooled Motors Corp	Spitz and Webb Advertising	18
Aircraft Owners and Pilots Ass'n		142
Alabama Institute of Aeronautics	Oakleigh R. French & Associates	148
Aluminum Company of America	Fuller & Smith & Ross Inc	143
American Optical Company	J. M. Mathes, Incorporated	110
Aviation Associates	Van Hecker, Inc	136
Bean, L. L., Inc	A. W. Ellis Company	150
Beech Aircraft Corporation	The McCormick-Armstrong Co.	20
Bell Aircraft Corporation	Addison Vars Co., Advertising	89
Bellanca Aircraft Corporation	Roberts and Reimers, Inc	131
Bendix Aviation Corporation—Eclipse-Pioneer Division	MacManus, John & Adams, Inc	82, 83, 115
Boeing Airplane Company	N. W. Ayer & Son, Inc	118
Bogue, Benjamin H.	N. W. Ayer & Son, Inc	152
Breeze Corporations, Inc	Burke Dowling Adams & Co	97
Cal-Aero Technical Institute	Oscar Nordin Co., Advertising	5
California Aero Glider Company	Ad-Age Advertising Company	152
California Flyers, Inc	John H. Riordan Co., Adv	88
Canadian Institute of Science & Technology, Limited	Ferres Advertising Service	126
Cessna Aircraft Company	Gardner Advertising Company	81
Champion Spark Plug Company	MacManus, John & Adams, Inc.	121
Chandler-Evans Corporation	Wm. B. Remington Inc	8
Chap Stick	Lawrence C. Gumbinner Advertising Agency	138
Cleveland Model & Supply Co	The Carpenter Advertising Co	148
Cleveland Pneumatic Tool Co., The	The Bayless-Kerr Company	18
Commonwealth Aircraft Inc	Carter-Owens Adv. Agency, Inc	132
Comptone Company	Byrde, Richard & Pound	138
Continental Motors Corporation	Wallace-Lindeman, Inc	137
Crowell, Thomas Y., Co	Franklin Spier, Inc	136
Culver Aircraft Corporation	The McCormick-Armstrong Co.	154
Curtiss-Wright Corp.—Airplane Div.	Landsheft, Inc	108
Davis & Davis	Tracy Locke Co., Inc	140
Douglas, W. L., Shoe Co	Harold Cabot & Co., Inc	123
Esso Aviation Products	McCann-Erickson, Inc	117
Ethyl Corporation	Batten, Barton, Durstine & Osborn Inc	102
Fairchild Aircraft	Cecil & Presbrey, Inc	101
Flightex Fabrics, Inc	Powerad Co	93
Funk Aircraft Company	Brooks-Wilson Advertising	130
General Tire & Rubber Co., The	D'Arcy Advertising Company	109
Giannini, G. M., Co., Inc	Sylvester Advertising Agency	114
Globe Aircraft Corporation	Evans & LeMay Adv. Agency	Color Section
Goodrich, B. F., Company, The	Batten, Barton, Durstine & Osborn Inc	3
Grumman Aircraft Engineering Corp.	Charles W. Hoyt Company, Inc.	106
Harley-Davidson Motor Co	Klau-Van Pietersom-Dunlap Associates Inc	144
Henry Leonard & Thomas, Inc	William G. Seidenbaum Advertising Agency	124
Hughes Aircraft Company		Color Section
Jack & Heintz Incorporated	The Griswold-Eshleman Co	16, 17
Jacobs Aircraft Engine Company	L. E. McGivena & Co., Inc	11
Kinner Motors, Inc	West-Marquis, Inc	95
Koh-I-Noor Pencil Co., Inc	Roeding & Arnold Inc	132
Kollsman Aircraft Instruments	Erwin, Wasey & Company, Inc.	9
Koppers Company, Inc	Van Sant, Dugdale & Co., Inc	103
Lear Incorporated	Arthur Kudner, Inc	127
Lewis School of Aeronautics	Frank C. Nasher, Inc	145
Link Aviation Devices, Inc	Craven & Hedrick Advertising	111
Lockheed Aircraft Corporation	Foote, Cone & Belding	Back Cover
Luscombe Airplane Corporation	The John Mather Lupton Co	Color Section
Lycoming Aircraft Engines	McCann-Erickson, Inc	98
Mall Tool Company	Charles Elwyn Hayes Adv	107
Manual Arts Press	Jewell F. Stevens Company	150
Martin, Glenn L., Company, The	Van Sant, Dugdale & Co., Inc.	19
Minneapolis-Honeywell Regulator Company	Addison Lewis & Associates	122
Morrow, Wm., & Co., Inc	Hudson Advertising Company	128
North American Aviation, Inc	Batten, Barton, Durstine & Osborn Inc	135
Northrop Aircraft, Inc	J. Walter Thompson Company	Color Section
Onan, D. W., & Sons	Graves & Associates	140
Pacific Airmotive	West-Marquis, Inc.	87
Pan American Navigation Service		153
Pioneer Parachute Company, Inc	Julian Gross Adv. Agency	133
Piper Aircraft Corporation	Hutchins Advertising Co. Inc	6
Plomb Tool Company	Willard G. Gregory & Co	104
Republic Aviation Corporation	The Albert Woodley Co.	Third Cover
Robinson Aviation Inc	Platt-Forbes, Inc	13
Rohr Aircraft Corporation	Barnes Chase Company	129
Romec Pump Company	The White Advertising Co	99
Roosevelt Aviation School	N. W. Ayer & Son, Inc	146
Ryan Aeronautical Company	Barton A. Stebbins Adv. Agency	14
Sensenich Aircraft Propellers	Foltz-Wessinger, Inc	149
Skylark Manufacturing Co., Inc	Brisacher, Van Norden & Staff, Inc	144
Snap-On Tools Corporation	Scott-Telander Adv. Agency	113
Solar Aircraft Company	Logan & Arnold Adv. Agency	141
Spartan Aircraft Co.—Spartan Aero Repair Division	The Potts-Turnbull Company	85
Spartan School of Aeronautics	The Potts-Turnbull Company	149
Sperry Gyroscope Company, Inc	Young & Rubicam, Inc	90
Standard of California	Batten, Barton, Durstine & Osborn Inc	10
Stanzel, Victor, & Co		150
Stern, L & H, Inc	Al Paul Lefton Company Inc	119
Thompson Products, Inc	The Griswold-Eshleman Co	139
Union Oil Company	Foote, Cone & Belding	7
Waco Aircraft Company, The	Spencer W. Curtiss, Inc	92
Weems System of Navigation	The Albert Woodley Company	147
Wright Aeronautical Corporation	Burke Dowling Adams & Co	Second Cover



AVIATION DICTIONARY
by CHARLES A. ZWENG

a new Encyclopaedic AVIATION DICTIONARY bristling with thousands of pertinent aviation words, and terms defined and explained: the keenest working tool in your aviation library . . . a necessary authority for the airman, instructor, executive and aviation student. Price only $6.00 postpaid or C.O.D.

NEW DEAD RECKONING EQUIPMENT
For Defense of Land, Sea and Air

PARACHUTE TECHNICIAN (Just published). Prepares for parachute Rigger Rating, basic text and "multiple choice examinations" included. DeLuxe Edition $3.00.

PRACTICAL MANUAL OF THE E-6B COMPUTER: By Allan C. Zweng. 400 problems explained and illustrated. Blue and Gold Deluxe binding. $2.00 postpaid.

RADIO and INSTRUMENT FLYING: By Charles A. Zweng, Instructor, U. S. Air Corps. New Edition covering new important material. Written especially to prepare the pilot for government examination for "instrument rating." Radio-Telephone Permit included with Meteorology, Radio-Orientation, let-down, off course and alternate airport problems. Only $4.00.

FLIGHT INSTRUCTOR: A new text covering the scope of the written examination for flight instructor rating. New Multiple Choice questions with answers included. Deluxe Edition $4.00 postpaid or C.O.D.

AERONAUTICAL TRAINING. New enlarged edition. For the first time shows separate sections containing Private Pilot and Commercial Pilot "Multiple Choice Examinations." Makes your government test easy. $3.00 postpaid or C.O.D.

AIRPLANE and ENGINE MECHANICS: Examinations, New authentic Quiz Book now covers the new Multiple Choice examinations fully illustrated with necessary diagrams. Used by Lockheed, Douglas, Northrup, Ryan and outstanding schools. Why fail? Only $3.00 for both examinations, and CAR.

Dalton E-6B (Army Type) Navigation Computer.. ..... $10.00

Cox & Stevens Dead Reckoning Navigation Computers De-Luxe with Instructions..... $35.00

Pan-American *Navigation Service*

DEPT. F-6, 12021 VENTURA BOULEVARD
NORTH HOLLYWOOD
CALIFORNIA

worth waiting for NEWS

No. 5 - HOW TIMES HAVE CHANGED THE FIFTH OF A SERIES OF INFORMATIVE ADVERTISEMENTS ABOUT THE NEW CULVER. PUBLISHED BY THE CULVER AIRCRAFT CORPORATION, WICHITA 1, KANSAS

COPYRIGHT 1945. CULVER AIRCRAFT CORP.

Spare nose and main gear for servicing Culvers in the field

HOW TIMES HAVE CHANGED!

IN the early days of aviation when an airplane moved down the production line, each component was especially built to fit on just one certain airplane. Should a service call come in from the field the question was never "Can you build the part?" but "Do you think if you sent out a certain part it will fit when it gets here?"

Times have certainly changed in the airplane industry!

Today we see literally thousands of parts made from the same jig with never a question as to whether they will fit when they get up to the assembly line, or if they are sent out into the field as spare parts.

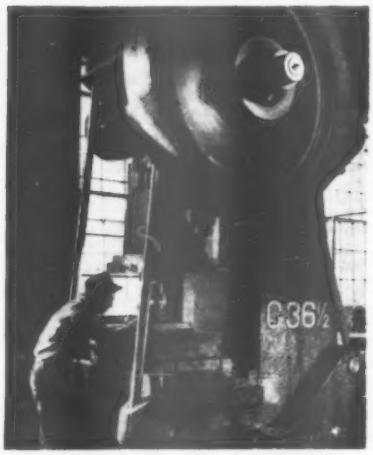
This, we think, is one of the important developments at Culver, for it assures the Culver buyer that not only will the parts fit when they come from the factory; but in our new dealer plan a complete stock of replacement, interchangeable parts will already be in the dealer's repair room.

Too little thought in the old days was given to keeping an airplane in service. We believe that an airplane in the air provides the most economical transportation. However, an airplane on the ground becomes the most expensive transportation. That's why Culver engineers in their design philosophy have kept uppermost in their minds the idea of service and easy maintenance. That is also why we at Culver are placing stringent requirements on all prospective dealers. They will be required to:

1. Maintain a complete inventory of parts.
2. Employ factory-trained mechanics.
3. Charge standard repair rates.
4. Operate a repair shop with factory-approved equipment.
5. Offer factory one-stop service.

Modern and expensive equipment at the Culver factory has made this sound service policy and interchangeability possible. Practically no part is handmade. Huge punch presses guarantee uniformity on small stampings. Steam presses pre-form all plywood components. By means of special dies on multi-ton drop hammers the cowlings are made of dural, then heat treated to give a section that is permanently formed and that defies rough handling in remaining perfectly formed. These are just a few of the innovations at Culver to insure interchangeability!

Combine Culver's interchangeable parts with Culver's Service policy and it adds up to a wonderful new era for Culver owners. And when the wings of peace usher in the commercial era, you'll be able to take your new low-wing, plastic bonded wood constructed Culver monoplane with the tricycle retractable gear, into any licensed Culver service station and know it will receive factory attention at fair prices. That day, as well as the New Culver, is well Worth Waiting For!



Large punch press eliminates hand work on Culver stampings

FOR THE LATEST INFORMATION WRITE CULVER AIRCRAFT CORP., DEPT FE, WICHITA 1, KANSAS

PRINTED IN U. S. A.

BIRD'S EYE VIEW

'Here, Herrenvolk and sons of the Sun, is what a Thunderbolt pilot sees as he peels off to wipe you out... You've heard about the Thunderbolt?*... Of course you have, but as we say in our quaint American way, you ain't heard nothin' yet... You've brought 'em down?... well, that happens, too, but at what a cost men. what a cost... The records tell that gratifying story. ¶ And nat instruments and other details of the few ships that fall into your han fine view. ¶ Confidentially, we're well aware that if you had the bl haven't the time... you haven't the material... and more important the kind of people... with the kind of spirit and the free-man's pride of accomplishment, which have made the name 'Thunderbolt', a synonym for allied air supremacy."

SQUAI
MATCI
THUNI

REPUBLIC **A**

CORPORATION

Farmingdale, L. I., N. Y.

Makers of the Mighty Thun

LIBRARY
PUBLIC LIBRARY
AVE
MICH 18 CPS

Jet PROPULSION

Lockheed leads again. The sensational jet-propelled Lockheed SHOOTING STAR is the fastest, highest-flying super-fighter in all the world. Again proof that Lockheed is years ahead in the science of flight.

LOOK TO Lockheed FOR LEADERSHIP

LOCKHEED AIRCRAFT CORPORATION, BURBANK, CALIFORNIA